Supporting progression in mathematics education

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Background
This project involved the creation of a final year project framework based on mathematics pedagogy. This would involve final year mathematics students visiting a local secondary school to observe teaching to GCSE and A-level classes, preparing material in consultation with teachers and delivering this to classes of the appropriate level from the assisting school. This would benefit students interested in progressing from their degrees onto a PGCE course by providing them with insight and experience into the nature of mathematics education and assessment at secondary school level.

The project had the additional goals of addressing stereotypes about mathematics degrees and encouraging secondary school children into mathematics degree programs. The goal was to bring classes to Nottingham Trent University where the lessons could be delivered by the students. In addition, this visit was planned to include: a campus tour; question and answer sessions with staff and students; and, a talk on university life, the nature of mathematics courses and careers. Given the relative gender imbalance in mathematics degree intake it was decided that we would work with a girls’ school.

Implementation
The project was made available to all final year students, regardless of gender, but it was made clear that those with an interest in female mathematics education would be prioritised. Two students (both female) applied to do the project and both were accepted.

The Nottingham Girls’ High School agreed to participate in the project. This school has results well above the national average and it is usual for pupils there to attend university after their A-levels. While mathematics is a popular subject at A-Level it is usually seen as a useful entry requirement to some other field of study such as science or medicine and not taken as a degree subject itself. It was hoped that the campus visit would be useful in raising awareness of mathematics as a viable degree option.

The two participating students each researched an area of mathematics not currently part of the National Curriculum and developed lesson plans, supplementary materials and assessment tools suitable for GCSE and A-level. One student focused her project on cryptography and the other on fractals. Both topics were thought to be of appropriate mathematical complexity and interesting enough to motivate the school children. To satisfy the requirements of a final year project in mathematics each subject

1For clarity, ‘students’ is used to refer to the final year degree students and ‘school children’ or ‘pupils’ to the members of the GCSE and A-Level classes involved.
was explored to a greater degree than was presented to the school children.

Two mathematics teachers at the Girls’ High School took part, each acting as mentor to a particular student. The teachers were generous with their time and made themselves available by phone and email for consultation with the students. The students attended the teachers’ maths classes on several occasions to observe and to assist where appropriate. During the first few months the students began to learn about teaching methods, learning styles, assessment methods and other pedagogic subjects.

In addition to writing their project scripts and producing an interim presentation, the two students built up lecture materials including hand-outs, group work sheets, feedback forms and lesson plans. A date was set for the visit and transport and catering was arranged. At this point the project experienced its first hurdle. One of the teachers who had been leading the project at the School end (the head of the mathematics department) was promoted to deputy head at short notice. Unable to spare the time that the project required she was quick to appoint a replacement to continue the project on her behalf.

Further pressure was applied to the project when one of the participating teachers arranged a holiday for the date of the visit. With less than a week to go we had to reschedule the visit. Given the tight timetable for project submission I felt that my first priority had to be ensuring that my students were not disadvantaged by a lack of time to write up the results of their projects. Instead of the school children visiting the campus our students went to visit them and delivered their classes at the school. Further problems were encountered when the rooms we had been told would be used were unavailable on the day. The alternative rooms lacked the expected facilities and this caused some last minute revisions (and concomitant nerves) for the students.

Evaluation

Whilst it was disappointing not to be able to provide the talks and tours that had been arranged, the actual lessons delivered by the students were well received by the teachers and the school children. Feedback suggested that the lessons had been considered to be of high quality by the teachers and interesting by the students. The group work on fractals was especially well received.

The projects themselves were marked, second marked and viewed by our external examiner. All agreed that they were of first class standard. The two students both graduated with first class honours and have been accepted onto PGCE courses. Both are firmly committed to a career in teaching and both show every sign of great promise in their careers.

Discussion, further development and sustainability

The project has been run again this year in a modified form with 4 students. I am working with a variety of schools so we will be less reliant on any single school. Each student is working with at least one unique school and all schools will be invited on the same day for visits.

One unexpected outcome of this project has been talks between our Mathematics and Education departments about a ‘Mathematics Education’ degree. It is hope that this will be ready (in a limited, pilot form) for 2012 entrants.