Enhancing Transition of Students of Mathematics by School- University Partnerships

Farzana Aslam [a], Ewan Russell [a], Roy Bhakta [b], Sidney Tyrrell [a] and Jim Tabor[a]

[a]*Department of Mathematical Sciences*

[b]*Sigma Centre of Excellence for Mathematics and Statistics Support*

Faculty of Engineering and Computing, Coventry University, CV1 5ED

Abstract

School and universities are very different places when it comes to the teaching and learning experiences of students. As part of the more maths grads pilot project we have been working in local schools. This study looks at activities to stimulate learning in schools and their applicability or otherwise to the university context.

The study explores the potential of activities to raise student attainment, aspirations, confidence and awareness of the applicability of mathematics in order to facilitate the transition of students to HE. The opportunities to achieve the important aims of the project i.e. increasing and widening participation in the mathematical sciences in HE and groups which are under represented at HE are also explored. The results indicate a priority area for us to explore further that how we can address a significant number of students to make them more aware and confident about mathematics. This is the time to realize the extent of 'mathematics problem'. A strong focus by schools, universities and employers is required to build up 'real partnerships' which lead to success in achieving the project goals.

Introduction

Mathematics is perceived by many students as being boring, hard not relevant to their future with no promising employment opportunities (Smith: 2004). In addition to this there is clear evidence that the current curriculum in schools fails to stretch and motivate the more able students and it has been indicated that many stake holders believe there is a crisis in teaching and learning of mathematics. Furthermore the standard of teaching mathematics is also reported below the average standard for all subjects and there is lack of engagement and motivation in many key stage 4 pupils, resulting in limited uptake of the subject post-16 (Ofsted annual report: 2005)

The decline in the number of students studying mathematics consequently influences the intake of students onto mathematics courses in HE. Also affected are intakes on to Science and Technology courses. A 'Mathematics Problem' has been indicated by university academics for some time, particularly at the transition from school to university. Furthermore the decline in the number of mathematical sciences graduates is not just a problem in the UK but is rather an international issue (European Commission: 2004).

The more maths grads pilot project has been designed by the mathematical sciences community of England to address the 'Mathematics Problem' by the 'School-University partnership'. This is a three year pilot project in three regions: West Midlands, Yorkshire & Humberside and London, funded by the Higher Education Funding Council for England (HEFCE). The universities involved are Coventry University, University of Leeds, and Queen Mary College, University of London. In addition Sheffield Hallam University will provide an investigation into the HE Curriculum theme and will work on national scale.

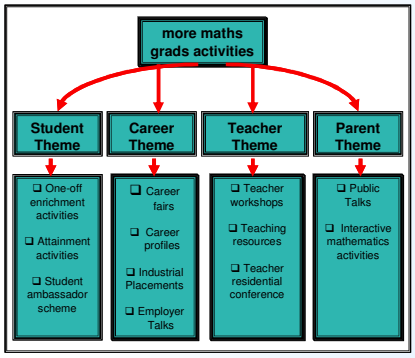
Aims of more maths grads

The principal aims of the project are:

➲To increase the number of students taking mathematics post-16 and progressing to mathematical sciences degrees, and to widen participation in mathematical sciences from the under represented groups in HE.

➲To increase the number of mathematical sciences graduates in England to fulfil the demands of education sector, Industry and Commerce.

Delivery of project and activities



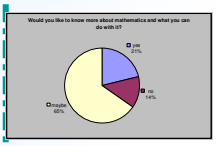
Results and Discussions

➲ Three interactive hands on mathematics activities for year 9 & 10 students from 25 different schools located in Coventry and Warwickshire were organized at Coventry University and schools. These were high ability students, and each activity was 3 hours long.

➲ The activities included, logic puzzles, "Who wants to be a millionaire" focusing on ratios and percentages, shape and space paper folding and poster making and building a Mars rover. The events were evaluated by questionnaires, completed immediately after the activity, from 220 students and 25 teachers.

➲ The evaluations indicated that 98% students understood the activity and 93% students found it interesting.

➲ The results of student evaluation for these activities are indicated in chart:2, figure:1 and figure:2.



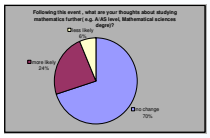
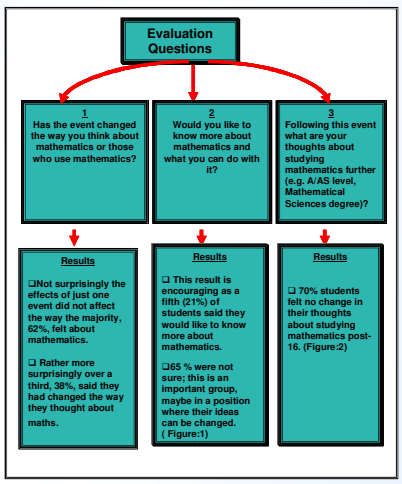


Figure :1, Results of question 2. *Figure:2 Results of question 3*



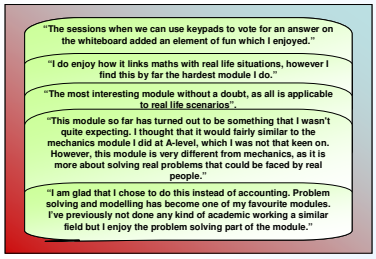
➲ Teacher evaluation indicated that 100% teachers considered the activities useful for their students and 95% indicated that the activities were useful for them. The results also indicated that 47 % teachers thought the activities will raise the aspirations of some of the students towards studying mathematics.

The transition to university

➲ Writing in 2000, Neil Challis, who is associated with the more maths grads project, commented on the difficulty of recruiting to mathematically based courses, the greater diversity in the academic backgrounds of students, and the fact that many students arrive at university lacking confidence in mathematics. He argued that university mathematics education can be improved by adding flexible approaches to a range of teaching strategies.

➲Coventry University first year mathematics degree include a module on problem solving and modelling designed to be more hands on and interactive in approach and thus similar in nature to some of the more maths grads activities in schools. The module gives students the opportunity to develop the ideas of problem solving at a relevant level and in a quantitative context. This involves the description of real open-ended problems of a simple nature in mathematical form and the subsequent analysis and interpretation needed.

➲ Student reaction has on the whole been very positive ,some of them are quoted below:



References

Annual report of her Majesty's Chief inspector of schools 2004/5 Ofsted Oct. 2005.

CHALLIS, N, (2000) Flexible learning in Mathematics MSOR Connections Vol. 0 No.4 pp 9-12

'increasing recruitment to scientific and technical studies' European commission life long learning policy , Development Mathematics Science and Technology, December 2004.

Smith A. (2004) 'Making Mathematics Count' Report of the post14 inquiry.

Conclusions

➲**While schools and pupils appreciate one- off interactive mathematics events, the more intensive structured presence with pupils, schools, teachers and the local community is required to achieve the aims and objectives of the more maths grads project**

➲**The activities designed to stimulate learning in schools have applicability in the university context. The mathematics of such activities may be of limited scope, but the abilities required to tackle open ended problems are developing rapidly as a student makes the transition from school to university.**

➲ **A strong focus by schools, universities and employers is required to build up partnerships which lead to success in achieving the project goals.**