Headstart mathematics courses – a new development

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The Engineering Development Trust (EDT) is an independent registered charity, established in 1984, running schemes to inspire and motivate young people to fulfill their potential through careers related to the whole range of science, technology, engineering and mathematics (STEM).

EDT runs several schemes and annually involves over 7000 12 – 21 year old students across the UK.

Headstart is a well-established EDT programme whose aim is to encourage students interested in mathematics or science to consider technology-based careers.

The current portfolio for Headstart courses includes a wide range of Headstart broad engineering and single disciplines courses. Headstart needs to offer opportunities to encourage and enthuse students in all STEM subjects and the single most obvious current omission was in mathematics.

For the first time this summer a Maths Headstart course will be run at Durham University. This will expose students to intellectually stimulating mathematical challenges. Underpinning the whole programme is the importance of proof and how this makes mathematics different to the other scientific disciplines.

A partnership was formed with Mathematics in Education and Industry (MEI) (who run the Further Mathematics Network) and the National Council for Excellence in the Teaching of Mathematics (NCETM) was also consulted. This confirmed that there is no other current UK provision of residential “taster” courses for prospective Year 12 (Lower 6th) mathematicians. This is also supported by ad-hoc requests received by Headstart and universities from pupils, parents and teachers.

Year 12 pupils are under tremendous pressure to make very important decisions at a critical stage in their education, often on the basis of limited information. All University prospectuses are glossy! Even open days offer a limited view of university life – Headstart courses enable students to make as realistic and informed decision about their future as possible. This increases motivation, commitment and academic outcomes during study and reduces undergraduate dropout rates. Studying a subject at University, even when it has the same name as a school subject, can often be a very different experience. The choice of university is also very important to the success and enjoyment of higher education. Headstart courses offer a combination of samples of academic study (workshops, lectures, and seminars), evening social activities, interaction with current undergraduates and post graduates, a visit to a company or relevant place of interest and also a question and answer session with young professionals.

Headstart has been running for ten years, so with that experience and established infrastructure is well placed to make a success of these innovative maths courses.

There are several objectives of the project:

1. To support young people make informed decisions about their future university studies. For some attendance on a Headstart Maths course will confirm their choice of future degree subject, increase their appetite for study and help them decide which options within the subject might be attractive in the future.

2. For some students participation will help them realise that a maths degree is not for them. This is also a positive outcome – at this stage before UCAS applications, when they still have time to consider and research related fields.

3. The long term objective is to increase the number of students studying maths at university and bringing their particular skills to all sectors of the economy and academic research.

4. The timing of Headstart courses, at the end of Year 12, as well as informing degree choices will also offer a boost and network of support to pupils who are not able to access excellent maths teaching in school, especially for further maths A2 level.

5. This is why the first cohort of Headstart participants will be recruited mainly from the Further Mathematics Network – students who are currently tackling this level of study through distance learning.

6. The launch of this project is very timely; the quality and availability of maths teaching in schools is an on-going concern, universities are looking at innovative ways to recruit more students to maths courses and employers continue to experience a skill shortage of able maths graduates.
The initial cohort of Headstart pupils will be recruited through the Further Mathematics Network, adapting existing Headstart promotional material and on-line processes. Applications were also received through our existing network of EDT schools and form the Headstart website. 123 applications were received for 30 places.

An experienced Headstart Supervisor is present at all courses, which are generally run in June/July. This is convenient for several reasons: most undergraduates have finished the academic year so accommodation is available, academic and support staff are still on campus to run the programme and pupils have finished their AS exams can actually attend the courses.

End of course questionnaires are collected and the data analysed over the summer. The Headstart supervisor’s reports and other assessment material are also collated so that a comprehensive evaluation of each course is ready by the following October. This is sent to the hosting universities along with an invitation to host courses again the next summer (subsequent academic year). Evaluation of the pilot course will receive close scrutiny and it is anticipated that the host university, prospective host universities, MEI and EDT would meet to assess the pilot. In the autumn pupil recruitment, via schools, commences and continues through to the following February.

The new maths courses will be given particular scrutiny. The interest from students, in terms of applications, will be compared with other new Headstart courses that have been launched previously. This will be monitored over 2 to 3 years to build a reliable picture of the demand. The pilot programme will then be evaluated and outcomes shared. EDT has a customised database which enables us to record data and track students (as far as is practical) to monitor actual subject of study, progress through university and 1st destination after degree. This will enable a long term follow up and impact measurement after the initial pilot phase.

A full communication plan will be developed for the project, separate to but in conjunction with the main Headstart communication processes.

Advice has been taken from MEI initially about contacting universities to actually host the courses. This has several benefits – negotiating with senior academics who have previously been introduced to the concept. EDT and Headstart have considerable experience of engaging with academics in engineering departments but this introduction to maths colleagues is very helpful. As the project grows wider forms of communication will be used such as articles in relevant professional journals and newspapers.

The other important aspect of communication is to recruit the Year 12 pupils. This is typically channeled through the schools and teachers. EDT communicates, through its regional network and centrally for Headstart with every school and college in the UK that has Year 12 pupils. Successful communication with teachers requires a number of key approaches:

1. a named contact;
2. informing the head teacher, but utilising a number of other communication channels to encourage activity;
3. a full range of communication methods from printed literature and posters to regular e-mails, updates and newsletters; and,
4. some personal contact (this is limited due to scarce resources).

Contact with all participants also has to be handled effectively – applications for courses are received through the Headstart web site.

Additional communication is also planned for this project. University colleagues, MEI and NCETM would be involved in meetings to plan the courses, evaluate the pilot and develop the programmed for the future and disseminate good practice and lessons learned.

This innovative maths Headstart course at Durham University is intended to give students a flavour of life in a Durham College. First-hand experience and advice is offered by student helpers who reside with the Headstart students in College. The course introduces the following topics for study:

- proof;
- mathematical perspective; and,
- problem solving.

In addition, students will be exposed to some shorter topics, including infinity and rational numbers. There will be social activities in the evenings and a visit to a gallery where they will be able to look at art from a different mathematical perspective. As with all Headstart courses, the programme will include a session led by alumni and employer representatives, illustrating the range of career opportunities that can follow a maths degree.

The 5 day residential Maths course for Year 12 students will be followed on the Friday with a “Dragonfly” Maths course for Year 9 girls, with some of the older girls staying on to act as mentors and role models.

There are already plans to increase the number of Headstart maths courses in 2011 and beyond.

For more information visit: http://www.headstartcourses.org.uk or contact Estelle Rowe, EDT Headstart Director, e.rowe@etrust.org.uk