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### Effective support for advanced level mathematics students: The Sixth Form College Farnborough

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#### Brief description

There are many ways in which teachers help students who are struggling with mathematics. Getting students on to the right course in the first place, and providing excellent teaching and additional support when necessary, are all vital. But often, what students need is to see someone else do the mathematics and explain it. This example looks at how technology can help.

#### Overview – the college’s message

‘We identified that the AS results of those students who had previously gained a grade B in GCSE mathematics were good, but could be improved. Our challenge was to improve the quality of support for those students, to help them make the transfer from GCSE to A level and to gain better grades. We’ve succeeded through a combination that includes alternative applied maths courses, tailored support and access to video resources to help students learn. The approach is proving successful: exam results are consistently above the high national rates for sixth form colleges, and value added, particularly at AS level, is good. The number of students dropping out of maths in the first month of the course has decreased and more students are doing well in the first AS tests that they take.’

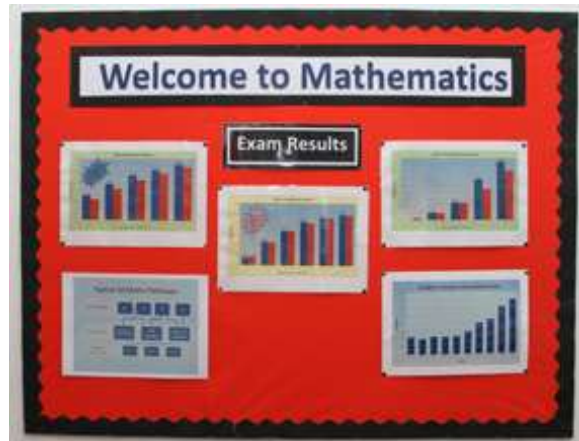
*Andrew Mason, Head of Maths*

#### The good practice in detail

Mathematics has always been a strong subject at the college. However, the number of students taking mathematics has increased dramatically over the past five years, from about 450 students in 2004, to over 1,500 students in 2010. More than 40% of the student population takes a mathematics course at advanced level.

## Students on the right courses

Providing the right menu of courses is an important feature of the offer at the college. AS level 'use of mathematics' was introduced in September 2010, with the option to continue it into a second year at A2. The course is appropriate for students with a grade B at GCSE who want to extend their study of mathematics beyond GCSE but who are more interested in its application than in theoretical ideas. Although not suitable for students aiming to study mathematics or some engineering courses at university, it is an acceptable A level for many other higher education courses requiring knowledge and use of mathematics at advanced level, such as business studies, biology, geography or psychology. 'We've designed it for students who like maths, but don't find it easy', says the curriculum manager for 'use of maths'.



Students study three modules at AS level, all of which are equally weighted. Algebra builds on their GCSE knowledge of quadratics and trigonometry. The laws of logarithms and graph transformations are studied and used to model real life data. In the free-standing mathematics qualification (FSMQ), 'data analysis', students use real data to study normal distribution and regression and to summarise and display statistical information. FSMQ 'Decision Mathematics' looks at the use of algorithms, graphs and networks to solve problems such as choosing the shortest route for a delivery van.



In the second year, at A2, students study three units: calculus (building on numerical and algebraic methods previously learned); mathematical applications and project work; and mathematical comprehension, where they solve real-life problems using techniques learned from all the previous modules. 'Use of maths' students are in classes of no more than 18, and have their own dedicated room for the subject. Students enjoy the practical approach in lessons, and like applying concepts to real-life situations.

All AS-level mathematics students study a common curriculum that builds on the work they did at GCSE and staff focus closely on helping students to make the transition to advanced level work during lessons. Their progress is monitored closely and they are given the opportunity to change course if they wish. Although most stay with their intended AS mathematics course, a small number have chosen this bridging period to transfer to the 'use of mathematics' AS course, when they found other topics too theoretical.

All students with a grade B in GCSE mathematics are required to attend an additional mathematics lesson each week. 'There are good links between topics taught in these different lessons' say students. Schemes of work for the AS course and the additional mathematics lessons are carefully linked so that each support class revisits the topic taught in the previous week's AS lessons. This gives teachers more time to consolidate learning and

to provide additional practice for students. Particular emphasis is placed on the topics that students find most difficult. Students take staged tests five weeks after starting the course, and are allowed to drop these extra lessons if they gain over 60% in their tests. However, many students choose to continue with them because they find them so helpful. A 'drop-in' mathematics workshop is also open for all students to attend and get extra guidance and support if they find they need it.



## Support from technology

However, the most innovative solution to providing additional support for students came to the Senior Curriculum Manager for Mathematics, Andrew Mason, in January 2010, when the college was closed due to heavy snow. With students about to take their examinations and missing lessons, Andy decided to video himself going through some past examination



questions, load them on to the college's 'moodle' site, and let students know they were there. By the end of the day, 30 students had watched the videos and when they returned to college, they said how useful they had been. The scene was set....

Over the next few months, teachers experimented with recording techniques, making better use of electronic whiteboards and processing to reduce file sizes for quicker downloading. During June, Andy recorded all

the autumn homework assignments. Each question was completed in a two to three minute presentation. The files are loaded into a secure account on 'YouTube' and linked through 'Moodle', for easy access by students.

Staff discussed whether recording should be live and available to students from day one, or loaded bit by bit, following each homework assignment that is set. Eventually, they decided to make everything available from the start, arguing that if students simply copied the solutions, then at least they had spent time watching the videos and learning from the presentations. The only thing that staff asked of students was that they noted whether they had used the video on their homework when they submitted it.

At first, students' use of the video support was slow and by October 2010, the site had received just 1,000 viewings. But as word got around (and according to Andy, the homework got harder!) viewings increased and by the end of the autumn term, had exceeded 10,000. Far from simply copying the solutions, most students use the support wisely, and when needed. They generally try the homework questions first, and use the videos if they run into difficulties. As one student said, 'It stops you getting worked up about your homework when you're stuck.' Others use the videos to check their answers. They are happy to state that they have used the videos when submitting homework and some have even used different coloured inks to show, in their working, where the video has been of help.

An analysis of video use shows that 30 questions have been viewed more than 200 times, with one particularly tough question on differentiation having been viewed 340 times. To extend and improve the resources, teachers have begun to ask students to video themselves answering an examination question. As Andy says, 'If all 700 AS mathematics students do one question each, we will have enough to cover the last 30 years' worth of examination papers!' The main obstacle to this development is the technology; most of the file sizes are much larger than the limit accepted by 'Moodle' or by Microsoft Outlook. However, the students are keen and excited about getting involved with this different approach to learning.

## A vibrant learning environment

Videos are not the only way in which students are encouraged to learn mathematics through visual stimuli. The classrooms are full of vibrant displays which make the areas bright and attractive – and remind students constantly of key mathematical concepts and principles. Nonetheless, Andy is also careful to point out that excellent teaching and learning in the classroom, and strong teamwork are at the heart of the college's outstanding results in mathematics. Teachers share resources and practice and co-location in a mathematics



workroom, and physical and virtual spaces devoted to storing resources for teaching and learning, also help. 'We share ideas and practice a lot,' said one member of staff. 'Everyone is willing to try it, keep it, or bin it.' The team is well led and supported, and teachers are enthusiastic, motivated and keen to teach the various different mathematics modules offered to the students. 'We're not sniffy about the different maths modules,' said one member of staff. 'All are equally valuable, important and interesting to teach. What's most important to us is that students study the modules that best meet their needs and interests, and that they are helped by us to do as well as they can.'

## The college's background

[The Sixth Form College, Farnborough](#) is one of the top performing sixth form colleges in the country. It serves the needs of full-time students aged 16 to 19 in north-east Hampshire, south Berkshire and west Surrey. In the most recent Ofsted [inspection](#), the college was judged to be outstanding; the most recent [inspection](#) of science and mathematics provision also judged this curriculum area to be outstanding. The college recruits over 3,000 students annually. Of these, 98% study at least one advanced level course. More than 75% of second year students progress to higher education.

Are you thinking of putting these ideas into practice; or already doing something similar that could help other providers; or just interested? We'd welcome your views and ideas. Get in touch [here](#).

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