



# JOBS FOR THE GIRLS

“It started when our head teacher asked me into her office to discuss a proposal to help fill an enrichment period, three times a fortnight, for a group of Year 9 students,” begins James Brady, head of technology at Simon Langton Girls’ Grammar School, Canterbury. “The world was my oyster; I could cover whatever I wanted without the pressures of the National Curriculum, homework, attainment etc. and enjoy simply teaching the good old fashioned way – by having fun!” As an engineering graduate, James had become increasingly frustrated by the lack of sixth formers applying to university to study a degree based around engineering or technology, rather than the core science degree routes; medicine or biomedical sciences. “In addition, the local area has been hit hard by the closure of the Pfizer site at Sandwich, which employed around 6,000 people,” he continues. “So I decided to take the opportunity to change attitudes towards engineering amongst our students, by teaching it in a new and engaging way.”



**EVERYONE’S TALKING ABOUT STEM – BUT ONE SCHOOL IN KENT IS PAYING MORE THAN LIP SERVICE TO ITS PLACE WITHIN THE CURRICULUM...**

The result of this line of thinking was the introduction of STEM (science, technology, engineering and maths) as a specific and discrete subject in the school – initially just for Year 9 students, to help them grasp key features of the science, mathematics and design and technology curricula by taking part in project-based learning. The lessons are quick, snappy and do not dwell too much on theory; the students build their knowledge by participating in practical activities and learn as they progress, often by learning from mistakes or failed ideas. For example, a recent project, developed by Dr Tim Lesworth (head of physics at the school) saw pupils develop model designs for a boat hull, built from Styrofoam. These were then tested in a purpose built 3m tank; the power to the small propeller coming from a small solar cell on the ‘deck’; this concept has recently been explored by Mitsubishi to reduce the carbon footprint when transporting oil around the globe. The students could see in groups which hull proved the most efficient by reaching the end of the tank the quickest, therefore simulating the best hull profile with the least amount of drag. The next cohort of students will be shown their peer efforts and hopefully make improvements when the exercise is repeated, building real life research into lessons and giving the students theoretical

background knowledge they can apply in their physics lessons as a later date. The school also has links with both UCL and Southampton universities, in a project called Oceanfoil, to develop wingsails to cut down on oil consumption by the use of the power of wind.

In 2012, Simon Langton was selected to be one of 20 schools across the country to take part in a government study trialling how 3D printers could be used to enhance teaching and learning across the curriculum. Now, three of these impressive machines take pride of place in the school’s recently refurbished STEM lab – a combination of a classroom, laboratory and workshop, which was opened by inventor Trevor Baylis in December 2013. It is here the students have already designed and built a working hoverboard (think Back to the Future) using a garden leaf blower – and James is already setting their sights on the next project. “We want to build a life size prosthetic ‘robot’ hand using the 3D printer and powered by a series of motors,” he enthuses. “I was inspired by the Paralympics and a Lao charity called Hope, which manufactures limbs for victims of unexploded bombs left from the Vietnam War. We have a very skilled group of students who will use the facilities to work on the research project and our dream would be to send one out to Lao.”





Last year, Vince Cable brought to light the 'enormous pressures' faced by the engineering industry due to a lack of women entering the profession. In fact, the UK currently has the lowest number of female engineers in Europe, estimated to be around 7-9%. "Unless we break that psychological barrier we will have enormous problems for years to come," Cable told the Guardian newspaper. "Half of all state schools don't have a single girl doing physics. We are only tapping half the population." The Perkins Review, a government study commissioned to find ways in which to boost the engineering industry, describes how a growing, changing economy will generate yet more demand for engineers. 4.5 million people currently work in the engineering sector – however, only 16% of graduates qualifying in

the engineering sector are female and it appears this number is falling.

"Clearly, as a girls' grammar school, we are in an ideal position to do something about this," observes James Brady. "We began by running a trial of STEM lessons with two Year 9 classes, but it soon became clear that they were having a large impact and really increasing student interest in engineering." From September 2014, therefore, every student at the school has been studying STEM in Key Stage 3, twice a fortnight. "The lessons are very well accepted by the students, because each session focuses on a new area of engineering or builds on a previous lesson's knowledge" explains James. "The girls have made ice cream in five minutes to understand chemical reactions, designed pedal powered attachments for bikes, looked at

investment casting and cast their own jewellery, supported by Remet, a local casting company. Chemistry teacher Andrew McGeoch even encouraged a whole year 8 class to design and build a range of trebuchets to understand forces and motions." Other groups of students have researched earthquakes using a fully operational seismometer and built small robots to play football. Older students have participated in school trips to view the Bloodhound SSC land speed car and the BMW Mini factory in Oxford.

This increasing emphasis on STEM for all aims to build on the recent success that saw Simon Langton encourage 24% of students apply to study an engineering or design based degree in 2012. "We think we are the only school in the UK teaching STEM as a full time subject," concludes James, "and by starting young with our students, and raising the awareness that the engineering sector genuinely does provide excellent future job prospects, higher than average wage earnings and increased job satisfaction, we hope we can do our bit to help dispel myths surrounding the traditional 'overweight men in blue boiler suits' image of the profession."



## ★ GIRLS: WISE UP AND STUDY STEM



WISE (Women in Science & Engineering) is a campaign group that has been working for 30 years to support education and industry in the UK to attract more women and girls into rewarding and exciting STEM study and careers. The group's mission is to push the presence of female employees from 13% across science, technology, engineering and mathematics to a critical mass of 30% by the year 2020.

"We passionately believe that engaging school girls with maths and science, particularly physics, at an early age and opening their eyes to the wealth of opportunities that there are available is essential in order to drive towards our goal," says WISE director Helen Wollaston. "Key influencers such as teachers, siblings, peers and parents also need to be encouraged to support girls' choices to pursue STEM subjects as a positive step forward, and not perpetuate outdated stereotypes of engineering only being a realistic option for boys."

● To celebrate the success of female pupils already excelling in this area WISE has a dedicated 'Girl' Award at its prestigious annual awards event, which in 2013 was

won by Leicestershire teenager Saheefa Ishaq. Aged just 13, Saheefa won the award, presented by WISE's Royal Patron, HRH The Princess Royal, for showing outstanding potential in science at an early age. She has already achieved international recognition for her project designed to find the most effective method of cleaning kitchens and food preparation areas, and set up a website to share her findings. Schools are welcome to nominate an outstanding female pupil for the WISE Awards 2014 – for more information, just contact campaigns manager Sarah Shaw (s.shaw@wisecampaign.org.uk); there is also a category for Advisors, which last year was won by Sheffield teacher Kathryn Boulton-Pratt for her efforts to encourage girls to study science.

● WISE is also working with industry to promote technical apprenticeships to girls. The UK will need 87,000 engineers qualified at level 4+ and 69,000 qualified at level 3 in each year between now and 2020 to meet demand from industry. An engineering technician apprenticeship is an increasingly popular entry route into the profession as young people can earn whilst they learn, acquiring highly sought-after work experience before going onto study for a degree at a later stage if they so choose. The next 'Building

Your Future' event is at the new First Direct Arena in Leeds on Saturday March 15 2014; more information can be found at [wisecampaign.org.uk](http://wisecampaign.org.uk)

● For older pupils looking at continuing their STEM studies through further or higher education, girls can apply for the Range Rover Evoque WISE Scholarship. This is a bursary awarded to an outstanding applicant to support her studies financially and via mentoring and industry support.

● Teachers can request the WISE poster, '101 jobs from science and maths', which highlights a multitude of careers that science and maths subjects can lead to. It's free on receipt of an A4 SAE covering costs for postage and packaging; just call the WISE office on 01274 724009.

