

Engineering Update

Summer 2007

In March we were delighted to hear that the Bromley consortium of Newstead Wood, Langley Park School for Boys and Bromley College had been successful in their application to pilot the new Engineering Diploma, which is targeted at students aged 14 to 19.

At Newstead the focus will be on delivering the Diploma at levels 2 (KS4) and 3 (KS5). We feel this will complement the students' existing studies whilst reinforcing the development of thinking skills, creativity, problem solving and team work - in short, the core skills required by our future engineers.

This year has also seen the school receive DFES funding for the development of a true engineering project, delivered within the curriculum, involving all key engineering subjects. More information on this and our other engineering related activities can be found in this newsletter. Again we thank all those that have worked with us in support of our aims.

NEWSTEAD ENGINEERING CHALLENGE KICKS OFF

In what is hoped to become an annual event open to all Bromley secondary schools, the first Newstead Engineering Challenge took place on June 18th.

As well as promoting the key engineering skills of problem solving, creativity and team work, the challenge also aims to enable students to develop and apply their science, mathematics and design & technology skills.

Attended by teams of either year 9 or year 10 students from Newstead, Bullers Wood, Hayes School, St. Olave's and Langley Park School for Girls, the challenge was set and over-seen by three engineers from TV's Scrapheap Challenge; teams were given the task of making a working model of a trebuchet or medieval siege machine.



The winning team from
Langley Park School for Girls

Machines were judged according to their accuracy and distance capabilities, with victory going to Langley Park School for Girls in their final against Hayes School.

Feedback received indicates that all participants enjoyed their day, which also achieved its aim of developing both staff and student enthusiasm for engineering.

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COMMUNITY NEWS

The summer term is when much of our work with the local school community takes place. With the overall aim of strengthening and enhancing engineering skills, these activities either take place at Newstead or, where possible, are hosted at the recipient school.

Outlined below are just some of the projects involving local primary schools that have already taken place. Further projects - an Architectural Challenge involving several local primary schools and an Architectural Design Masterclass for Prendergast School - are also scheduled.

SYSTEMS & CONTROL

Carried out at Farnborough Primary School for their year 5 students, staff from Newstead taught a series of three lessons introducing the basic principles of Systems and Control.

Students were given the opportunity to create computer programs in the form of flowcharts and to control real life models including a juggling clown, a lighthouse, and a car with an opening door and alarm.



Flowol control software in use with car model

CAM BASED POP-UP TOY

Giving the students the opportunity to design and manufacture their own toy to keep, this project also introduces students to mechanisms in the form of cams, to convert rotary to reciprocating motion.

Students gain experience in the use of workshop techniques such as drilling, sawing and filing to manufacture a front panel of their own design.

Additionally, as an introduction to Computer Aided Design and Manufacture (CAD/CAM), students use 2D design software to design their follower / pop-up component. This is then manufactured using a computer controlled laser cutter.



Proud owner of a self designed and manufactured pop-up toy

BUGGY MANIA

This popular project involves students in the construction of a buggy chassis that can be propelled in a number of ways. Comparisons are made between different methods of propulsion including wind/balloon power, elastic band, and electric motor based propeller or pulley drives. Students evaluate all methods and choose which they feel is the most successful for building into their own vehicle.

Schools involved to date this year have included Red Hill Primary School and Crofton Junior School.



Henry Ford would be proud

When hosted at Newstead, students also benefit from an additional science session introducing them to the concept of speed, i.e. as a measure of distance travelled in a given time. This includes a demonstration of how computers can be used to log event times and calculate speed.

CSI NEWSTEAD

A murder has taken place at Newstead! Can forensic techniques solve the case?

Students require strong stomachs to carry out a series of scientific tests on brain tissue, blood, bones and other clues found at the scene of the crime (all simulated of course).

Attended by students from Tubbenden Junior School this science activity provided them with an excellent introduction to tests used in real laboratories, including pH testing, protein testing and ink chromatography.



Brain tissue; it's not looking good!

DFES ENGINEERING PROJECT

As a result of funding from the DFES Newstead has this year developed what is considered to be a true engineering project, uniquely delivered within the curriculum and involving the co-ordination of all key engineering subjects, i.e. Design & Technology, Science and Maths.

Water turbines were chosen as the project theme with the project pilot being conducted in the Spring Term. A group of year 8 students participated.

The focus of the project was energy transfer, with students initially introduced to the subject in their Physics lessons. This was followed up by the students making their own water turbines from card and plastic, with testing of these turbines being carried out in the Engineering Suite using data loggers and sensors.

In Mathematics, basic integration techniques were used to determine turbine efficiency.

Designs were further developed in Design & Technology using computer aided design and our laser cutter for precision manufacture. Further testing was then carried out to determine improvements in turbine efficiency.

This project was judged a great success and planning is currently underway to ensure that it is integrated into next year's curriculum.

Water turbine ready for testing



GO4SET / CREST AWARDS

As briefly mentioned in our last newsletter a team of six year 9 students have been involved in the Go4SET initiative to design a water collection and recycling system for Newstead.

Working with Martyn Begbey a structural engineer from R Durnell & Sons Ltd, and David Brook an automotive engineer from Ford's Dunton Technical Centre, the team produced a wide range of ideas which included using a grass roof and ultraviolet sterilization and filtering systems.

The final solution, based around a large underground rainwater storage tank in the school's quad area, was designed to supply recycled rainwater to the lab sinks and toilet cisterns.

A working model of this was presented at the Celebration and Assessment day held at London's South Bank University in March, where the Newstead team won the Pupil's Choice prize of £250.

The girls also received CREST Silver Awards for their work on this project.

Year 8, 9 and 10 students are currently working on their Silver Crest Awards for Science. CREST awards are an extra-curricular activity, the silver award requiring 40 hours of science based investigative / project work.

Investigations include 'The corrosive effect of Coca-Cola on teeth', 'The science behind Tsunamis' and 'How to use modern forensic science to solve a Sherlock Holmes mystery by comparing fiction with reality'.

**Our Go4SET girls
Alice Cambridge,
Catherina DeBoos,
Supriya Gopinath,
Nicole Sparkes,
Corina Thomas
and Lily Webb.**



BREATHING FOR LIFE CHALLENGE

Rowing machines, a Batak board, peak flow meters and much more arrived at Newstead in June. The event being a workshop run by Learn by Design, kindly subsidised by GlaxoSmithKline.

Help in using this equipment was provided by two very fit 'deliverers'.



Peak Flow Meter in use

Students were provided with a worksheet to record the results of their activities - whilst at the same time extending their knowledge of the circulatory and respiratory systems.

The students learned that aerobic respiration is used for sustained, long periods of exercise, but when intensive exercise is carried out over a short length of time anaerobic respiration takes place.

During anaerobic exercise a build up of lactic acid occurs, which causes cramp and is why this type of exercise cannot be sustained.

This particularly challenged the students beyond the confines of the Key Stage 3 curriculum, and it could be said that they were 'actively' learning in more ways than one.

SMALLPEICE TRUST STEM DAY

The Smallpeice Trust is an independent charity providing exciting programmes to promote engineering careers to young people.

In January this year Trust staff member James Alterman came to Newstead to oversee a day long science, technology, engineering and maths (STEM) session in which our partner secondary schools, Ravenswood and Prendergast, were also invited to participate.

STEM sessions encourage creative thinking and problem solving and appeal to students with an interest in design, manufacturing or engineering. Students from year 9 were placed in small teams to work on a challenging 'design and make' project – specifically to design and produce a wind turbine using commonly available materials.

Teams were tasked with presenting their design, highlighting its features and advantages. A winning team was then chosen, based upon the success of their solution and the standard of communication.

The Trust also runs inspirational residential engineering courses that mainly take place at universities throughout the UK, details of which can be found at www.smallpeicetrust.co.uk. Members of the winning team were each given vouchers worth £20 off the cost of any such course.

Fifteen year 9 students will be attending the 'Engineering Experience' 3 day residential course at the University of Plymouth this July.

THE RAPID RESPONSE ENGINEERING CHALLENGE

Allowing Newstead students to assume the role of RedR (Registered Engineers for Disaster Relief), this challenge gave the girls an insight into the key issues faced when trying to restore order to a disaster struck area.

Focussing on actual natural disasters, such as Hurricane Mitch in the Honduras, the challenge demonstrated the role that civil engineers play in such situations.

Organised by Rav Azad, volunteer event facilitator for the Institution of Civil Engineers (ICE), this day long event took place in March this year, being run as a competition between teams of students.

Teams were required to build temporary shelters (tested by having water thrown against them – with two brave students inside), and to establish a water supply system around obstacles using bamboo sticks, plastic sheeting and half-cut drain pipe.



Help is at hand from Newstead students

FORMULA SCHOOLS

Our second year of entry into this competition once again saw our intrepid team of girls heading to Silverstone for the racing finals in June. Requiring months of preparation and practice, this competition pits schools' remote controlled model cars in a Formula 1 style racing competition. Our students should be commended for coming 14th out of the 61 schools that took part.

Following on from this, in July, was our first entry in the Schools Marine Challenge, which saw the girls working extremely hard preparing a remote controlled model boat for the competition held against 17 other schools at Horsham in Surrey.

In spite of very poor weather conditions, those who took part thoroughly enjoyed the day.

IN BRIEF

Arkwright Scholarships

We are delighted that four students have been awarded Arkwright Scholarships this year. This is an outstanding achievement as only 170 scholarships are awarded nationally, and our congratulations go to Amy Hunter, Katherine Redhead, Hannah Southan and Sorrella Smith.

Masterclasses with Toh-Shimazaki Architecture

This is the fourth year that Yuli Toh has led these masterclasses for our exceptionally able year 7 & 9 design and technologists. Focussed on challenging the students' ability to solve problems, twenty students from each year were required to design 'A Real Time Space'.

Isambard Kingdom Brunel Visits Newstead

The latest in our popular series of evening community lectures was given by 'Brunel in Person' (a.k.a. Robert Hulse, curator of the Brunel Museum, Rotherhithe). This presentation, which focussed on Brunel's first project, the Thames tunnel (the first tunnel to be constructed under a river), provided an interesting insight into Brunel's character, family and his engineering prowess.

2007 Salters' Festival of Chemistry

Newstead year 8 girls achieved great success at this year's festival, which comprised a day of challenges and a lecture entitled 'Magic Chemistry'. Congratulations go to the girls who achieved 2nd place in the 'Salty Tale' challenge, which required analytical chemistry skills to solve a 'whodunit' mystery, and a superb 1st place in the University challenge having manufactured the bounciest ball.

International Links

There have been very pleasing developments in our links with Hamburg this year. In October last year we welcomed Wolfgang Mackens, Professor of Mathematics at the Technical University of Hamburg-Harburg and colleagues from the Hamburg Authorities. This was followed-up more recently with a further visit by the Hamburg Authorities in July. Furthermore, an exchange programme to support year 12 students on work shadowing abroad has been established with Alexander von Humboldt Gymnasium, which it is hoped will lay the foundations for further opportunities next year.