Professional development for teachers – inspiring students to take science, technology, engineering and mathematics: Petroc

URN: 130646
Region: South West
Remit: Further education and skills

Provider background

Petroc is a large general further education college with two Devon campuses: one in Barnstaple and the other in Tiverton. The college was judged to be good overall at its last inspection. Science and mathematics were judged to be outstanding. The inspection report says:

> 'The college makes particularly good use of science, technology, engineering and mathematics initiatives to broaden students' understanding of these subjects. It takes good action to sustain these activities by responding to learners' demands… collaboration with partners [is used] very effectively to enrich the curriculum with work placements, visits, assessments and training.'

Brief description

Many young school children enjoy science, particularly practical investigations. Yet this interest does not always translate into success in the sciences at secondary school or sustaining this early interest to seek careers in science, technology, engineering and mathematics (STEM). This example shows how teachers and managers at Petroc have successfully inspired students to continue their enthusiasm about STEM subjects and to progress to related further and higher education.

The good practice in detail

Petroc staff worked hard with school staff and local technology firms to make sure that STEM learning activities take place regularly. STEM events are not only fun, but

help develop the attitudes and skills that are crucial in gaining the knowledge and understanding needed to achieve national qualifications. In addition, their work has successfully focused on high quality professional development for STEM teachers to update and develop their subject knowledge while investigating new pedagogical approaches to their teaching. Along the way, some strong and productive relationships have developed with local and national STEM businesses and national and regional STEM training organisations.

Cerian Ayres, Teaching and Learning Quality Manager, explains how the project developed and the benefits to the college:

> 'It all snowballed after we started providing hands-on science and technology activities for school children in our area. Both college campuses are in largely rural areas, quite a long way from major cities and it is expensive and takes a long time to travel to the venues. As a result, we decided to put on our own STEM enrichment activities locally.
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> First we contacted the schools, both secondary and primary, and offered them STEM activities for their pupils. This of course was enlightened self-interest as any pupils inspired by our activities might then come to study at Petroc.
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> At the same time we were developing contacts with local and national STEM-related companies to provide extra-curricular enhancement and careers advice for our own students.
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> After a short while it was evident that school teachers accompanying their pupils to STEM events were very interested in STEM updating and in trying out different approaches to teaching and learning in a STEM context.
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> So, with the support of senior managers, we asked the teachers what they wanted and developed regular continuing professional development (CPD) sessions to meet their needs. Again, we regard this as 'seed corn' because interested teachers will enthuse their pupils who will then be more likely to take STEM subjects further after GCSE. In point of fact, our recruitment to STEM subjects at Petroc has never been better.
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> We collaborated with STEMNET to set up a STEM Ambassadors scheme. Once we got the ball rolling with national initiatives, it was easier to plug into other things like funding for Big Bang events, Bloodhound STEM Education and Action Research through the National Science Learning Centre.
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> Without the support from senior managers, money in grants from STEM organisations, the collaboration of employers and, above all, the whole-hearted support from Petroc STEM and guidance staff, we could not have achieved the successes we see today.'

Engaging with primary school children

Petroc managers and staff are very experienced at facilitating STEM activities for school pupils, post-16 students and trainees in order to get them interested and enthused about progressing to STEM careers.

Over the past decade the college has led very successful STEM events to include large-scale conferences and STEM fairs for primary pupils. These hands-on events are hugely popular with schools across north and mid Devon and increasingly much wider afield.

By listening to the pupils and by talking to their teachers, the activities are designed to be fun, to motivate the children and to link to the National Curriculum topics that are taught from Reception to Year 6.

'Big Bang' days have been held at both campuses for a number of years, in which:

- hundreds of primary school children have lots of fun taking part in science, engineering and technology activities
- help is provided by the 108 STEM Ambassadors the college has recruited and trained
- students provide very positive role models for the children and develop key employability skills for adult life and enhance their UCAS personal statements.

Building on success with secondary schools

Parallel to the work with primary schools, Petroc has also provided STEM activities for secondary schools.

These range from engineering sessions related to Bloodhound SSC and Formula One in schools, to the ecology and conservation of rare species on sand dunes and high-level mathematical activities.

Following a mathematical enrichment session, Matt, a Year 11 pupil at Braunton Academy said:

> 'Tackling the higher level topics was quite daunting and completely different to how we work at school, but we all really enjoyed the session and are keen to do even more next year. These sessions made it clear to me that I definitely want to take mathematics at A level and the challenge that brings. I also see that I need to be working towards this now.'

As a result of the Bloodhound activities, the Petroc Formula One schools team designed, tested and raced the fastest car in the UK schools' national competition in 2012.

Andrew, a student STEM Ambassador said,

> 'I really enjoyed the whole process for designing the car through to producing the end product and this inspired me to apply for and gain entry to the Design Engineering degree at Bristol University.
>
> I also really enjoyed running the F1 in Schools workshops for primary and secondary school pupils at the Petroc Bloodhound event. It gave me a real buzz to see young kids getting so much out of something I helped to organise and run.'

STEM Ambassadors

Each year Petroc staff recruit and train student volunteers to become STEM Ambassadors through their STEM Ambition Academy. The students take part in a range of activities, equipping them to provide STEM activities and presentations for school pupils. All this is run in conjunction with a STEM career-mapping activity and helps them prepare for the UCAS application process.

Andrew Lovett, headteacher at Tiverton High School, wrote,

> 'What is particularly strong about Petroc's STEM work is not just their one-off projects but their day-to-day lower profile work. We have worked with them on the joint delivery of mathematics and science curriculum at both institutions. Tiverton staff deliver part of the A level curriculum at Petroc and we welcome their staff onto our timetable.
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> Together we ensure that the learning journey for our young people is seamless; the curriculum is aligned and the Key Stage 4 to 5 transition is a positive one. Our students are benefiting from the commitment of Petroc's staff to their courses.'

Updating and developing staff

It quickly became clear that teachers in participating schools were keen to be part of activities in STEM developments. Therefore, Petroc began delivering some STEM 'updating':

- Demand became so great for this training that the college now integrates STEM CPD into its regular schedule of staff development and publishes a newsletter monthly to remind teachers of courses and updates.
- This year, the schedule contains one-hour sessions or half-day sessions for every week of the academic year.
- This work has been crucial to helping teachers develop interesting, relevant and inter-disciplinary practical approaches for their pupils.
- It has created a community of teachers and college staff who are actively promoting STEM and inspiring young people to progress to STEM careers.

Primary school teachers sought specific CPD to allow them to capitalise on the Bloodhound SSC STEM Education and Formula One in Schools initiative and some secondary school teachers sought help integrating STEM activities into sports curricula.

STEM enhancement modules were developed in collaboration with Plymouth University and City and Guilds leading to integrated initial teacher education programmes so that the new generation of teachers can have a head start with STEM expertise.

Mike Colton, 14–19 Coordinator for the North Devon Partnership of Schools and Colleges, says:

> 'Teaching colleagues are well-informed and have the opportunity to be fully involved in STEM initiatives. The resulting impact on students and their learning has been significant and is reflected in the high uptake of STEM subjects in progression to post-16 pathways and study programmes.'

Collaboration with businesses

Of course, none of this happens without extensive and sustained collaboration with STEM businesses and companies.

Petroc staff have formed strong relationships with local and national STEM enterprises. Local businesses have been involved from the start with developing relevant practical activities and taking part in careers fairs and parents evenings.

Peter Wright, Director, Wonderstruck Ltd, says,

> 'In a rural setting, where opportunities to interact with STEM businesses and higher education may be limited for many learners and teachers, the work Petroc does in this field is invaluable and my company is proud to be part of it.'

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