

Inspiring Scotland's Young People into STEM

College Case Studies

Introduction

Colleges provide a unique learning environment for STEM, with hands-on opportunities to ensure that learners are ready to go out into the workplace or progress on to higher education.

Participation in STEM needs encouragement from primary school, both to promote a positive approach, but also to affect changes that will result in a real shift in people's attitude towards STEM subjects, particularly with regard to gender. But more than that, the college sector recognises the importance that a long-term partnership approach between schools, colleges, universities and employers brings in helping to widen access, address gender imbalances and inspire all young people to gain the STEM related skills required to make meaningful choices for their future careers.

STEM permeates all aspects of college activity and offers opportunities along the full length of the skills pipeline, providing seamless progression from school through to the workplace.

Ayrshire College

Almost 200 Ayrshire female pupils had an insight into science, technology, engineering and mathematics (STEM) careers at Ayrshire College's Kilwinning Campus on Friday 16 February 2018. The event was part of the College's *This Ayrshire Girl Can* campaign and was delivered in partnership with SmartSTEMS, a Scottish charitable organisation which seeks to encourage more diversity in STEM.



P7, S1 and S2 pupils heard from inspirational speakers, Katie Cole from Cyber Security Challenge and Lisa Neilson of Worksmart Contracts, and took part in three workshops throughout the day. The activities were delivered by Ayrshire College, FemENG, the Forestry Commission, Fujitsu, Seric, ThinkTank Maths, the RAF, and the Royal Navy. Pupils also interacted with exhibitors at the event from EDF Energy, EGGER, and the Glasgow Science Centre.

The Girls into STEM event was part of a wider programme of activity organised over the week by the College for its Ayrshire Festival of Learning, a series of events with a particular focus on digital skills. On the same day as the Girls into STEM event, a Taster Day for S4 pupils took place at the College's Ayr Campus.

Ayrshire College vice principal, Jackie Galbraith said ***“Our This Ayrshire Girl Can campaign helps girls and women to learn about and try out exciting learning and career opportunities in areas like digital technologies, science and engineering. Working with organisations like SmartSTEMs enables us to tap into a wide range of expertise in these areas.”***

City of Glasgow College

Bunmi Onanuga is currently studying Mechanical Electronic Systems Engineering at Glasgow Caledonian University (GCU) following the successful completion of an HND and HNC in mechanical engineering at the City of Glasgow College. She is one of the college's pioneers; the HNC course was Scotland's first women-only in engineering, part of a wider effort by the college and partners to address the stark gender inequality that exists in the science, technology, engineering and mathematical (STEM) professions.



She is aiming to become a chartered engineer. She said: **“My advice to women aspiring to be engineers is sign up for the course. It may require a bit of hard work, but it is very rewarding when you put in the hours. There is no better time to start than now.”**

Bunmi's fellow student, Laura Phillips, is now studying Computer Aided Mechanical Engineering at GCU. She has also become an executive member of the Scottish Association for Engineering Education and, along with Bunmi, was a 'primary engineer' working alongside children as they undertake STEM projects at school. Ultimately, Laura has her sights set on working in the space sector.

“The only advice I would give to other women would be, to take the first step. You don't know what you are capable of until you challenge yourself. The journey may not always be easy; however, the satisfaction of achieving what you set out to do is worth any short-term sacrifices.”

Edinburgh College

Jessica O'Leary is completing a five-month electric vehicle (EV) scholarship designed to ensure she leaves college equipped with a greater depth of knowledge in electric vehicle technology, helping her to become an accomplished employee who can support the motor industry with future sustainable transportation developments.



“Electric and hybrid vehicles are becoming more mainstream today because of the move to become more sustainable, so I was really keen on getting involved in something that will help to keep my learning up-to-date with what’s happening across the wider world”.

The EV scholarship is run by the Edinburgh College Development Trust, the independent charity that supports students at Edinburgh College, and is funded by Alex F Noble & Son, a long-established Midlothian-based Nissan car dealership. Jessica is the second student to have been selected to complete the programme having shown a real interest in EV technology during the application process.

“I love problem solving, identifying issues and spending time to figure out the best possible solution. I guess that, alongside my strong interest in cars, meant that coming to Edinburgh College was the best thing for me to do after leaving school.”

Since starting college, Jessica has spent the majority of her time in the workshop, an environment which in previous decades has been typically home to men. However, Jessica believes girls should not be discouraged from entering the automotive industry.

“It really doesn’t matter. I’ve loved cars for a long time and I’m passionate about working in this industry. That’s what truly matters – it’s about being what you want to be and being happy.”

Dumfries & Galloway College

Former Dumfries & Galloway College student Mikyla Prowse has been presented with a set of tools and diagnostic equipment by her lecturers at the college to recognise and celebrate her new role as an Apprentice Mechanic with Arnold Clark car dealership in Dumfries.

Whilst still attending Wallace Hall Academy, Mikyla successfully completed the Introduction to Vehicle Technology course at the College through our school link partnership programme, putting her in a prime position after she left school to take on the Apprentice role with Arnold Clark Motor Company based on Annan Road in Dumfries.

Mikyla secured her new job role towards the end of last year and is now thoroughly enjoying her time as an Apprentice.

“It’s been great to work here so far and I really feel my time at the college has helped to get me where I am today. I really enjoyed the course, especially the practical elements and being able to get my hands dirty! I would definitely recommend the pathway I took at college to anyone looking to train in the Motor Vehicle Industry and I now hope to become a fully qualified Mechanic with Arnold Clark”.



Fife College

Fife College has developed and introduced a variety of learner-focused programmes including Speedy STEM which is delivered at primary and secondary schools across Scotland.



This unique and inspirational idea has been an astounding success with schools in Fife and beyond. It uses a series of accessible, scalable activities that use every day, familiar components in a contextually related way. These activities are then rolled out over successive years with more challenging activities to both consolidate and reassure through evolving learning and understanding.

Speedy STEM pulls in a very wide range of stakeholders from all sectors including the armed forces, finance, engineering and energy, construction and renewables. The concept is presented to all pupils giving them a taste and experience of STEM employment opportunities in a fun, interesting and interactive way that is highly thought provoking and memorable.

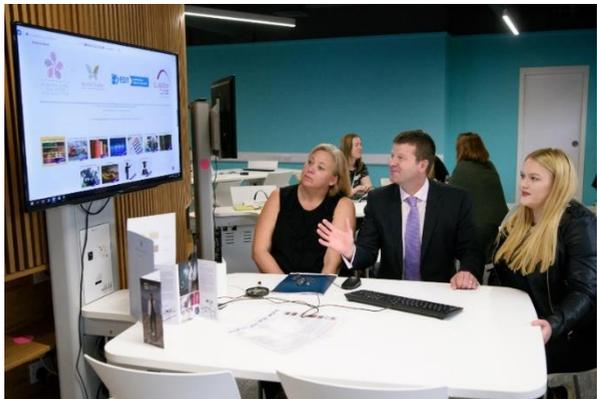
A number of activity stations (usually around 6) are set up in a large hall or a collection of classrooms and each is staffed by a college or industry Activity Leader balanced to represent Science, Technology, Engineering and Mathematics but coming from all vocations. This forms the 'Speedy' station format around which groups of 15 - 20 pupils rotate typically throughout a 6 period school day.

The success of the concept and implementation is evidenced by an accelerating demand for our STEM Events by all: **Over 10,000 school pupils have engaged in these STEM activities in 2016-2017 and the gender split is 50-50.**

Glasgow Clyde College

Material World is an industry led STEM-based online learning resource supporting the textiles sector in Scotland.

Following a year of development, the programme received £43,500 of funding from The Glasgow Clyde Education Foundation will be delivered in partnership with the Engineering Development Trust (EDT), the Scottish Textiles Skills Partnership and Glasgow Clyde College. The venture aims to attract new talent and showcase the diverse roles and career opportunities within the textiles industry.



Supported by the industry, Material World is a course of eight lessons using Scottish textiles, leather and fashion products to explore science, technology, engineering and mathematics (STEM). The course covers core units including exploring natural and manmade fibres, fabric structures and properties, and innovation.

Students will learn about the textiles produced in Scotland, from iconic fashion fabrics to technical innovations such as body armour or knitted textiles used inside the body to save lives.

Sally Maidment, project coordinator at Glasgow Clyde College, said: ***“The textiles industry is often forced between two subjects – fashion and art, but in reality, the industry is heavily focused on STEM subjects and that’s what we are really hoping to push with this programme.”***

North East Scotland College

Lisa Shaw was already working in NHS dental services as a lab assistant when she saw an advert giving members of staff the chance to apply for a Modern Apprenticeship. She was keen to take on a new challenge and knew she wanted a practical job with further progression and a training programme.

The Modern Apprenticeship in Mechanical Manufacturing Engineering (Fitting and Assembly) involves working at the hospital with patients who are fitted with prosthetics, orthotics, or use manual and electric wheelchairs and spending time in college learning theory and practical (three days a week).



Lisa enjoys working with people and having the opportunity to rotate around different departments during the training. She said, **“I am really enjoying my Modern Apprenticeship – a 9 to 5 desk job would never have suited me! Being able to work while having the opportunity to learn practical skills is great and I would highly recommend it to others.”**

Once qualified, Lisa will be a Mobility and Rehabilitation Technician. She is keen to continue working in the NHS because there are a range of excellent opportunities.

New College Lanarkshire

Budding engineers on an apprenticeship programme at New College Lanarkshire are flying high in their studies – after building a fully functioning drone.

The S5 pupils, from schools across North Lanarkshire, are in their first year of the Foundation Apprenticeship programme in Engineering. As part of



the programme, the apprentices have been learning how to use industry-leading 3D design software to produce initial drone concept prototypes. They also worked through an electronic design phase, developing practical skills in electronic assembly. The drone was then manufactured using 3D printers in the College.

Since its inception, the drone has been on a number of test flights on the college grounds, reaching speeds of up to 160 miles per hour. The project is now being entered into the regional Airengineers STEM challenge in the Summer – requiring secondary school pupils to design, build and fly their own drone.

Steven Hewitt, Curriculum and Quality Leader for Electrical, Manufacturing and Mechanical Engineering at the College, said: ***“The Foundation Apprenticeship programme is linked directly to industry, with many industrial partners participating in supporting placement opportunities, industry visits, talks and challenges. The project engages the apprentices in design, electrical/electronic engineering and mechanical engineering.”***

West College Scotland

Within the west region in Scotland we have built a strong STEM partnership which has greatly reduced the time and resources required to engage with long term sustainable STEM projects and help to further embed STEM within our curriculum areas.



West College Scotland hosts the DYW West region team and this has allowed a strong interactive team to be built within both of these institutions. We both complement each other in skill and outlook and this arrangement has been found to greatly enhance all areas of education and employment.

One key aspect of this is the Bloodhound Rocket Car Challenge which is a large-scale project we run with the support and guidance of Energy Skills Partnership (ESP). The project promotes STEM careers to learners for S1 to S3 and allows this to happen in a fun competitive environment. Our learners have to design, build and test a model of a land speed record attempt vehicle within a set of engineering design briefs.

ESP strongly supports with guidance and occasionally funding when appropriate, West College Scotland staffs take care of the training and development needs of our partners as well as running the learning and teaching components of this project. Our DYW partners help make contact with all of the right contacts within the Local Authorities and Schools to help drive this project through our region. This partnership working has helped us to grow the Bloodhound project by over 30% per annum reaching the correct groups of learners and greatly enhancing their understanding of STEM type careers.

One local authority partner said: ***“On behalf of all 5 schools represented today how much the pupils enjoyed and benefited from their day. I have no doubt the event will inspire our young people into careers in STEM in the future.”***

West Highland College

A Big Bang event was held at Lochaber High School last year. This event was aimed at S2 and S3 pupils who took part in a series of STEM related activities throughout the day.



Pupils experienced first-hand how STEM subjects relate to potential careers and were inspired to explore these subjects further through a variety of fun interactive STEM activities and challenges including the Bloodhound Scotland Rocket Car Challenge. A key aim of this event was to 'promote the engineering, construction and energy sectors as a career of choice' and to ensure that the supply of skills provided by the college network meet industry's skills demand.

On the day **272 school pupils from Lochaber High School (S2 and S3) pupils were inspired to explore STEM subjects** and their relation to potential careers through activities run by The Army, RAF, Royal Navy, Skills Development Scotland, University of Strathclyde and key local employer, Liberty House Group. Pupils also experiences hands on STEM activities including Virtual Welding and Immersive Hybrid Reality – Working at Heights.

West Lothian College

West Lothian College has signed up to the Greenpower Team Challenge which starts in the autumn.



The challenge is part of the Greenpower Education Trust's objective to advance education in the subjects of sustainable engineering and technology to young people.

Foundation Apprenticeship Engineering and VRQ Vehicle Maintenance learners from West Lothian College are taking part in the project which has seen them design and build an electric kit car – continuously testing and adapting the car based on the theory they are learning alongside the project. The project has been a practical element linking to the curriculum for these programmes, which is providing the learners the opportunity to apply their skills in a practical manner.

As well as developing an electric kit car, students will be responsible for creating and developing a race strategy. Once completed, learners will race the cars in competitions across Scotland and have the potential to also enter into UK-wide races.

Whilst building and maintaining the Greenpower racing car, students also develop essential skills such as communication, negotiation, organisation, teamwork and project management.

Colin Miller, Head of STEM at the College, said: ***“The Greenpower Team Challenge is a fantastic opportunity for our students to design, build and race a Greenpower kit car, which is suitable for use in the established Formula 24 and Formula 24+ categories and to learn while working on a practical project which is also fun and exciting.*”**

“The project links with other colleges to share facilities such as use of composites laboratories for body, spray painting and a wind tunnel for aerodynamics.”