

# **Science, Technology, Engineering & Mathematics Skills (STEM)**

**A response to the Enterprise & Business Committee's Inquiry into STEM**

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## Introduction

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1. ColegauCymru welcomes the opportunity to respond to the Enterprise and Business Committee's follow up inquiry into Science, Technology, Engineering and Maths (STEM). ColegauCymru represents the 15<sup>1</sup> further education (FE) colleges and FE institutions in Wales.<sup>2</sup> In 2011/12, there were 214,850 individual students attending college and 229,615 enrolments.<sup>3</sup>
2. Colleges are major providers of general education provision in Wales, helping to produce some of the best learner outcomes. Colleges are the predominant providers of funded vocational and technical education in Wales, delivering about 85% of the total provision.
3. Colleges have played their part in facilitating progress in achieving the aims of *Science for Wales* and its associated Delivery Plan. Although these two documents, particularly the Delivery Plan, were focussed on STEM skills and research at the university level, colleges have played an increasing role in ensuring that they are producing the supply chain of STEM skills into the workplace and into higher education. Colleges work closely with employers in technological and scientific fields - alongside the relevant Sector Skills Councils - to ensure that the skills possessed by learners match the needs of the business or organisation.
4. To promote the increased take-up of vocational subjects in STEM areas, the key importance of STEM subjects needs to be continually promoted, particularly in schools. It is crucial that a high status vocational learning route encompassing STEM subjects, apprenticeships and higher technical qualifications including a degree is as well understood by learners, teachers, lecturers and parents as the GCSE-A level-degree route. Current research has shown that young people are not aware of the choices available to them at 14.<sup>4</sup>
5. This response will highlight (i) the crucial role played by colleges in the provision of STEM skills, and (ii) colleges' work to raise the profile of vocational skills (including STEM skills) through the promotion of national and international skills competitions. We also address some of the particular points raised by the committee in some of the terms of reference of the inquiry in the final section of

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<sup>1</sup> The 15 include 10 FE corporations including St David's Catholic College; the two FE institutions - WEA Cymru and YMCA Community College; and The College Merthyr Tydfil, Coleg Sir Gâr and Coleg Ceredigion which are part of university groupings.

<sup>2</sup> In this paper the terms 'FE college' and 'college' are used to cover FE colleges and FE institutions.

<sup>3</sup> *Further Education, Work-Based Learning and Community Learning in Wales 2011/12 SDR 48/2013*, Welsh Government (March 2013).

<sup>4</sup> For example, *New Directions: Chrysalis Research* (2011), a survey of 1,620 15-19 years and 1,693 parents.

the paper before outlining some of the recent achievements of colleges and their learners in relation to STEM (in the Annex to this paper).

## Colleges are key in the supply of STEM skills

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6. Colleges are pivotal to the supply chain of STEM skills in Wales. Colleges equip their learners with these crucial skills in a variety of contexts. The way in which this supply chain operates can be classified via five main routes. These are:
- Through colleges' **work with partner schools in the areas of vocational education**, particularly as part of the 14-19 Agenda. Through these links, learners in schools get an important taster of vocational skills, giving them a chance to consider a broader range of routes into employment or to a higher level of study.
  - Via learners' study for **general education qualifications such as A-levels in STEM areas** at colleges. Colleges in Wales are major and high quality providers of general education provision in Wales, including in areas such as Neath Port Talbot, Llanelli, Merthyr Tydfil, Blaenau Gwent, parts of Wrexham and south Gwynedd that have tertiary provision. Colleges are successful in ensuring that their students gain the opportunity to progress to further study in higher education, including at the most prestigious UK universities.<sup>5</sup> Progression to higher education by college leavers has increased in recent years (by 35% from 2007 to 2010), and this includes notable increases in progression into STEM study at higher education, particularly in South West Wales.<sup>6</sup>
  - Through mainstream **full-time and part time-provision of vocational and technical qualifications** in STEM subjects up to level 3 (such as BTECs, National Vocational Qualifications, and other qualifications). These can be broken down into the following STEM related areas by the volume of completed learning activities at colleges (at all ages) in the 2012/13 academic year (with learning activity 'completion rates' shown in brackets):

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<sup>5</sup> See the successes of colleges in getting learners into the UK's most prestigious universities: <http://www.walesonline.co.uk/news/wales-news/welsh-colleges-set-new-standard-7173663>

<sup>6</sup> See South West Wales Regional Learning Partnership / Coleg Sir Gâr Report 'FE to HE Progression', March 2012, p.5.

<i>Science and Mathematics</i>	13,745 (89%)
<i>Engineering and Manufacturing Technologies</i>	16,540 (92%)
<i>Construction, Planning and Built Environment</i>	12,930 (92%)
<i>Information and Communication Technology</i>	22,860 (93%) <sup>7</sup>

- Through **work-based learning (including apprenticeships) conducted by colleges in STEM areas**, often with a STEM vocational education qualification at the heart of the programme of learning. Colleges are major providers of work-based learning in Wales.
- Through **Higher Vocational Education at level 4 and above** (i.e. at high level skills), through Higher National Diplomas, Higher National Certificates, Foundation degrees, BTEC Advanced Professional Diplomas, and other qualifications. Higher Apprenticeships are a growth area here since funding for them from the Welsh Government was made available in 2012.

## Encouraging the take up of STEM skills through participation in skills competitions

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- An effective way to encourage learners to take up the study of vocational qualifications in STEM areas is through learners' participation in skills competitions. Colleges in Wales, working with partners, have played a key role in inspiring students and work-based learners to take their skills to the highest level. Learners who do well in skills competitions are used as role models for future cohorts of students.
- Barry Liles, Principal of Coleg Sir Gâr, is the designated Skills Champion for Wales and is Chair of the Skills Network for Wales. This Network co-ordinates the work of education and training providers and employer organisations in relation to skills competitions, helping to boost the profile of vocational skills across the nation. The various levels of competitions include:
  - Skills Competition Wales** consisting of around 30 local skills competitions, funded by the Welsh Government via the European Social Fund and run by the Skills Network. This helps build up the supply chain of competitors for the national and international competitions.

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<sup>7</sup> See Table 2a in the Statistics for Wales publication 'Learner Outcomes Measures for FE, Work-Based Learning and Adult Community Learning: 2012/13 (SDR 57/2014), published 3 Apr 2014.

- **The Skills Show**, held annually, is the UK's biggest skills and careers event which was last held on 14-16 November 2013 at the NEC, Birmingham, drawing in 100,000 visitors. The Skills Show hosts WorldSkills UK Competition Finals across 70 vocational sectors. During the event over 700 of the UK's most talented apprentices, employees and learners – including 59 from Wales – competed to be named the 'best in the UK' in their chosen vocational skill.
  - **WorldSkills** itself, which takes place every two years. It brings together young people under the age of 25 from across the world to compete for medals as 'the best of the best' in their chosen skill. It is considered the international 'Olympics' for vocational skills. Team UK at the last WorldSkills in 2011 was made up of 43 competitors aged 18-25. The youngest member of Team UK was David Bowen, an 18 year old web design student at Coleg Sir Gâr - David won a Medallion for Excellence in web design. The next WorldSkills takes place in Brazil in 2015.
9. To take this forward further, the Skills Network and Coleg Sir Gâr, on behalf of the further education sector, are leading a new **Inspiring Skills Excellence** project (funded by the Welsh Government). Over a three year period the project will provide the supportive infrastructure to ensure delivery of improved medal winning success at national and international skills competitions for competitors from Wales. The project will achieve this by:
- targeting sectors of economic interest to Wales, supporting the skills required to increase GDP
  - providing specialised, high quality coaching and development of competitors
  - raising the skills and knowledge of training provider staff in order for them to deliver a pool of competitors displaying world-class skills talent, and
  - engaging with and supporting the employers of competitors, demonstrating the benefits of competition engagement whilst showcasing Welsh industry to the world.
10. The project will ensure that Wales will be in a position to develop a greater number of competitors for selection to Team UK for EuroSkills 2016 and the next-but-one WorldSkills in Abu Dhabi 2017.

## Specific issues raised in the follow up inquiry

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11. The committee has raised particular points in relation to the implementation of *Science for Wales* and its Delivery Plan. These points include:

- **Value for money for public investment:** ColegauCymru considers that value for money is generally being achieved in relation to the public investment provided for STEM vocational skills programmes in colleges and work-based learning. Colleges are efficient deliverers of STEM programmes: success and completion rates at colleges are high even in those areas, such as STEM, which are considered by some learners to be (rightly or wrongly) more challenging. It will be important in the new Welsh Government funding regime, which is based on learning programmes rather than qualifications, that the additional costs of putting on STEM provision is reflected in the tariff given to colleges for a STEM learning programme.
- **Education and Business links:** Colleges thrive on their close connections with business of all shapes and sizes. These range from major companies such as GE, Airbus and British Airways, at one end of the scale, to the 10,000 SMEs that colleges relate to at a local level (figures based on a 2011 ColegauCymru members' survey). Ensuring the relevance of vocational STEM programmes is crucial and colleges work not only with the relevant sector skills councils but directly with employers to ensure that this is achieved.
- **Women and STEM related careers:** As Statistics for Wales data in the published bulletins is not broken down by sex, accurate data on gender imbalances in the take up of STEM subjects in colleges or work-based learning is not easily available. There is some anecdotal evidence that the number of women taking up the study of STEM subjects in colleges is increasing. Colleges actively participate in projects and schemes such as 'Girls into Engineering' run by the Education Engineering Scheme Wales - STEM Cymru that seeks to address this imbalance. However we acknowledge that much more work needs to be done to increase the take up in STEM subjects by girls at school and women in colleges.
- **Supply of education professionals:** There is a continuing need to attract education professions to teach STEM subjects. At a recent conference in the University of South Wales, it was pointed out that STEM graduates often gravitate towards banking and finance rather than into engineering or into teaching, While there have been campaigns in the past to attract specialists

into teaching in schools, no similar campaigns have taken place to attract them into further education.

- **Welsh Medium / Bilingual STEM study:** Colleges are committed to increasing the take up of all subject areas through the medium of Welsh. The college sector's National Strategy for Bilingualism (adopted in 2011 and forming an element of the wider Welsh Medium Education Strategy) has made improving opportunities for bilingual study a priority. As with other sectors, the availability of teachers/lecturers (or potential teachers/lecturers) with both STEM and professional Welsh language skills remains a key issue.

## ANNEX: Recent successes in STEM related areas

### **Queen's Anniversary Prize 2013 – Coleg Cambria**

Coleg Cambria won the highest form of national recognition open to a UK academic or vocational institution - a Queen's Anniversary Prize. Awarded for its vocational and engineering training in aircraft production and maintenance for Airbus and UK aerospace, the college was only one of three colleges across the UK to be recognised.

### **Knowledge Transfer Partnerships Wales Award 2013 - Grŵp Llandrillo Menai**

In 2013 Grŵp Llandrillo Menai won the Knowledge Transfer Partnerships (KPT) Wales Award becoming the only further education institution in the UK to make the UK finals. Knowledge Transfer Partnerships (KTPs) is a UK-wide programme, which brings together a business, a UK university or college partner, and a recently qualified graduate (associate) to develop a business opportunity. The KTP Wales Award Trophy was awarded to Grŵp Llandrillo Menai and G.L. Jones Playgrounds Limited for implementing a new product design process from concept to manufacture.

### **The Skills Show 2013 – Awards and Commendations (in STEM-related skills)**

#### **Gold Medallists:**

Bethanie Palmer & Andrew Dennis (Coleg Sir Gâr) – Environmental Science  
Luke Ellsmore and Alex Scott (Industrial Automation & Control Ltd. Newport & Coleg Meirion Dwyfor - Grŵp Llandrillo Menai) – Industrial Control

#### **Silver Medallists:**

Keiren Jones (Nationwide Crash Repair Centre) – Automotive Painting  
Nicholas Ralph (Coleg Gwent) – Electrical Installation

#### **Bronze Medallists:**

Joe Richardson (Bridgend College) – Microsoft IT Technician

#### **Highly Commended:**

Gethin Rhys Johnson (Coleg Sir Gâr) – Construction Metalworks  
Jediah Kristian (Coleg Llandrillo - Grŵp Llandrillo Menai) – Games Development