Evidence from the Alliance of Sector Skills Councils – STEM inquiry

Introduction

The Alliance of Sector Skills Councils in Wales has a key role in supporting the work of Sector Skills Councils in Wales, assisting in skill policy development at its earliest stages, coordinating the work of SSCs as the Credit & Qualifications Framework becomes established, and ensuring that Labour Market Intelligence and the views of employers are put at the forefront of economic development discussions.

The Alliance is pleased to have this opportunity to respond to the Enterprise & Learning Committee in relation to the STEM agenda in Wales. We have liaised with a number of SSCs to gauge their individual responses and opinions and the following document details the key findings in light of the questions raised by the Committee's inquiry.

The adequacy of provision of science, technology, engineering and mathematics skills in schools, further education colleges, higher education and work-based learning (including apprenticeships)

It was noted by Semta that the introduction of the principal learning and project qualifications into the Welsh Baccalaureate has been a good approach to mixing theoretical and practical learning. The concern from the engineering sector is that funding to support advice and guidance is disappearing in 2012, which could hinder effective implementation of the take-up of the engineering pathway.

e-skills UK have highlighted major issues with IT-related education in schools and with the uptake of IT-related subjects in higher education, which are seriously compromising the pipeline of future talent in terms of both interest and capability. e-skills UK research has shown that students' experience of IT at Key Stage 4 is the biggest single factor in the drop in uptake of IT-related education beyond that level. There is also a continuing decline in number of people studying relevant technology subjects at school and, although university numbers are now rising in Wales (but not at the same rate as for all subjects), a pervasive gender imbalance remains.

Further to this, too many IT-related 14-19 qualifications are not valued by either employers or higher education institutions, and therefore add little career value to the young people undertaking them.

The Welsh Baccalaureate in IT for 14-19 year olds, designed with input from more than 600 employers, universities, colleges, is a gold standard qualification, with full support of HEI'S and employers in Wales. Schools and colleges need to fully embrace the Welsh Baccalaureate in IT by ensuring that their practitioners are equipped to deliver the curriculum and working within a true partnership model.

SummitSkills have outlined that many schools do not have an active relationship or any direct links with the jobs market in Wales and this is reflected in the careers advice provided to pupils, which can often be limited and lack a wider sense of growing skill levels and moving from job to job.

Limited progress has been seen to date with regards to integrating future skills units into craft based study through the PTA (Pathways to Apprenticeships) scheme. ConstructionSkills Wales believes that integration of the Welsh Baccalaureate provides a greater opportunity for this to be achieved.

The STEM subjects are often viewed as the most challenging by pupils and yet they also seen to be the ones that are deemed most suitable for underachieving and unmotivated students within the 14-19 vocational provision offered by many partnerships. There would seem to be a mismatch or lack of understanding that undertaking a construction course at whatever level will require utilizing these 'difficult' subjects.

Cogent and EU Skills have also commented that FE provision is almost certainly sufficient in Engineering, but Technology is such a broad term covering so many areas that clarity is needed on what this covers. Science provision is considered to be weaker, especially for new technologies, but the difficulty here is that numbers will always be relatively small in the Welsh context.

It has been highlighted by ConstructionSkills Wales and SummitSkills that whilst there have been some commendable developments in higher education with regards to the provision of STEM skills in courses such as ONCs and HNCs, and latterly FDs which look progressively towards new skills, content and requirements, there has been limited progress overall in the effective integration of Key Skills (now replaced by Essential Skills Wales) within craft apprenticeships. This is also the case in relation to effective, consistent materials which allow those who struggle with numeracy and IT skills to develop these skills in context, for a purpose they understand.

As well as growing demand for level 2 and level 3 Apprenticeships, there is an increasing demand in the IT & Telecoms sector for higher level Apprenticeships (at levels 4 and 5 / Higher Apprenticeships) to meet current and future demand for new entrants.

Many FEIs and HEIs are under-equipped with the latest digital technologies. SSCs are showing a commitment to help address this issue, for example, Skillset Cymru is committed to developing capacity within the further education sector to respond to the current and future skills requirements associated with movement towards a Digital Economy in Wales. This SSC is currently piloting the Level 3 Creative and Digital Media Apprenticeship with support from the Welsh Assembly Government's Sector Priorities Fund Pilot Programme.

53% of computing graduates from Welsh HEIs who enter employment within six months of graduation are not in IT jobs. Whilst recognising that STEM educated people are also a valuable resource to other non-STEM sectors and occupations it would be worth looking at whether the reasons for this type of 'loss' in the final stages of the 'STEM educational artery' could be addressed.

It has been strongly suggested by the SSCs that the role of employers should be extended across the education and skills spectrum to include not only vocational qualifications but also general qualifications where appropriate.

Qualifications for 14-19 year olds should be expected to pass a test of being valued by employers and higher education in order to benefit from public funding. The employer test is particularly essential for education that is intended to prepare young people for direct entry to the workplace.

It would be helpful if provision were informed by employer-identified need through SSCs. A good example of a FE/HE pan-Wales approach is with energy and utility skills where Bridgend, Neath and Llandrillo colleges are working together with Glyndwr University to ensure coverage and collaboration rather than competition.

Proskills, EU Skills and Cogent are traditionally heavy users of STEM subject graduates, and identify increasing need for recruits with these skills both now and in the future.

While there has been a modest growth (3% since 2002) in the volume of higher education students studying STEM subjects over recent years the pace of change to accommodate developments such as renewable energy, the next generation of nuclear power stations, low carbon housing, manufacturing and travel are all likely to lead to increased competition for STEM qualified workers in the future.

Technology continues to offer perhaps the best way of making a transformational difference to any sector's underlying productivity. Asset Skills report that even in a traditionally lower-tech industry like cleaning, mobile technologies are now being widely exploited to improve worker productivity, communication and safety.

Retailing is yet another sector which has been revolutionised by technology in the recent past and looks likely to be so again. Skillsmart Retail predicts that online retailing will continue to increase its market share with, by 2012, £1 in every £7 in Wales being spent online.

It has been noted by Cogent and EU Skills that there is no central repository of information for STEM provision and therefore it is difficult to have a clear picture of the level of provision. The role of the National Science Academy in this regard needs to be clarified as soon as possible. Many SSCs have pointed out the plethora of activity but the absence of co-ordination in an environment which still has too much duplication and competition rather than clear linear progression.

The additional funding to support and promote STEM skills and whether the current supply of STEM skills is meeting the needs of the Welsh labour market, including international comparison with selected relevant countries and regions

The funding that goes into STEM is significant, but it is split between many organisations that operate in this arena. This is made worse by the fact that these organisations find it difficult to work in partnership because they see each other as competitors for funding.

e-skills have highlighted that despite IT & Telecoms being recognised by the Welsh Assembly Government as a priority sector, little funding is available for the sector currently. For example:

- CC4G (Computer Clubs for Girls) relies on schools and HEIs purchasing licences
- There is no pump priming of Welsh Baccalaureate principal lines of learning
- There is no additional funding for CPD of teachers as in England, and this is much needed if the IT skills level of teachers is to keep pace with innovation
- HEFCW supports projects to address issues of student demand for STEM subjects but has concentrated on chemistry, physics, engineering and maths.

e-skills pose the question over whether funding could be used to incentivise choices in STEM subjects of most value to the economy in Wales. As noted, it is difficult to assess the extent of quality IT professional provision delivered by colleges in Wales, but most is below Level 3. Funding should only support those qualifications identified as key qualifications in the Sector Qualifications Strategies of SSCs.

SummitSkills identified a shortfall in the number of people with expertise in emerging environmental technologies including installation and maintenance of micro-generation equipment.

ConstructionSkills Wales has outlined a number of well-funded initiatives which have sought to support STEM projects, from TVEI in the 1980s to the work of EBPs (Education Business Partnerships), Careers Wales etc. After more than twenty years of initiatives the fact that the questions here are still being asked would suggest that the approach has not been effective and that the teaching of science, engineering and mathematics has not been made interesting enough. This is most probably as much a cultural issue as it is an issue of the subjects being difficult to follow, with ability in the 'harder' subjects being seen as 'un-cool' in comparison to subjects such as media, sports science, drama. This, combined with uncertain career prospects and lack of an engineering employment base in many parts of Wales, has led to a drift away from STEM being inevitable.

The 14-19 work-based Learning Partnerships, which a number of SSCs were asked to develop, has been a wasted opportunity as funding was withdrawn while they were being delivered.

The supply of education professionals able to teach STEM subjects and the impact of Initial Teacher Training Grants and the Graduate Teacher Programme on recruiting STEM teachers and education professionals

There have been some good schemes organised over the last few years by Careers Wales (West) working in collaboration with Engineering UK where teacher awareness events have taken place with a number of employers hosting events across Wales. The Engineering UK scheme "engineers make it happen" led to a number of young engineers delivering inspirational lectures to students as well as teachers and lecturers. There is now no funding for this activity.

ConstructionSkills Wales has highlighted that there is likely to be an issue in the number of suitable well qualified individuals choosing to enter primary and early years education, which may well not appeal to engineers in the same way as teaching older age groups would. The basis of attitudes and abilities which secondary schools and colleges build on are set in the primary schools.

Skillset note that whilst individuals with deep, specific skills (such as graphic designers or programmers) are relatively easy to find, those with the hybrid or combinations of skills needed by the industry are not. An absence of cross-disciplinary awareness and understanding of role context is particularly significant. Demand for ever increasing levels of skill will require ongoing updating and acquisition by individuals in the latest technology or software and skills in research, information organization and self-education.

e-skills UK have commented that, in addition to curriculum reform, employers feel that activities such as STEM professional development, teacher knowledge and skills confidence could be more industry influenced. They would like to see similar developments in Wales to the Vital professional development programme in England. Delivered by the Open University and e-skills UK and funded by the Department for Education, Vital provides top class Continuing Professional Development for teachers specialising in technology (IT/Computing/ICT) and for those wanting to use ICT more effectively in the teaching of other subjects. Vital makes use of resources designed by employers, advice and support from ICT specialists and learning at employer venues.

The effectiveness of education and business links between education institutions and STEM employers

It has been conveyed by the SSCs that Employer-Education partnerships are the key to effective STEM policies and actions. We are pleased to see that Wales is looking at business contribution across the education and skills spectrum. All SSCs have strong employer bodies to inform skills and qualifications in Wales and all SSCs work with FEIs and HEIs.

It also appears that employers are confused by the amount of activity that goes on in this arena with the funding being split between many organisations, However, there are some good examples of industry working closely with education, for example Toyota have supplied brand new engines and gearboxes to all of the colleges that offer engineering and science subjects; some of these engines are the new Hybrid engines manufactured on Deeside. Four colleges have also received brand new cars for students to work with. Sharp Manufacturing have a learning centre that focuses on renewable energy, and this centre has many practical and interactive activities that promote STEM.

Colleges Wales also organise a pan-Wales awareness raising week which attracts over 1,000 students into colleges for a week where they are mentored by current apprentices and employers doing practical activities. The Engineering Education Scheme also provides good links between employers and schools which sets students tasks to solve real technical problems that companies have.

The implementation and impact of strategic policies and government initiatives to foster STEM skills including the role of the Chief Scientific Adviser, the National Science Academy and the Welsh Government's 'Skills that Work for Wales and For our Future (higher education) strategies and A Science Policy for Wales (November 2006)'

The Office of the Chief Scientific Adviser should help to coordinate activities by appointing lead organistions to deliver for STEM. SSCs could play a key role in this area but would require additional support to be able to do so.

Skillset believes that the creative industries must be given as much support as traditional STEM subjects to keep Wales at the forefront of the UK and indeed world economy. The new Economic Renewal Programme has been about establishing Welsh Assembly Government priorities and the creative industries has emerged as one of these key sectors of economic importance to the Welsh economy. Creative media education should, therefore, take its place alongside STEM subjects as a strategic priority for the Government.

e-skills UK would highlight that whilst STEM as a whole can be addressed through strategic policies, the differences in the subject and sector areas often need to be addressed through programmes and initiatives that are directly aligned to the sector/subject area. Technology is a priority area for Wales as it encompasses the IT & Telecoms sector and is part of the creative sector in the form of Software and Computer Games, as well as emerging technologies in power, energy and recycling.

A possible lack of awareness around the work of the Chief Scientific Advisor and the National Science Academy has been highlighted as has a potential mismatch between Skills that Work for Wales, the ERP and a focus on STEM skills.

If you have any questions about the information outlined above, please contact Elaine Moore, Alliance Manager Wales, on 02920 444135 or at elaine.moore@sscalliance.org