



# Enterprise & Learning Committee

## Inquiry into STEM skills

This document is the e-skills UK initial input into the forthcoming Enterprise & Learning Committee inquiry into the development of science, technology, engineering and mathematics (STEM) skills

### Summary

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The key points we would like to make to the inquiry are:

- > **The systematic engagement of employers** is the best way to ensure that education and skills development will respond to the current and future labour market. The IT & Telecoms sector is a key 'consumer' of STEM skills and employers in the IT & Telecoms sector in Wales are particularly interested in the supply and development of technology skills that help their businesses to innovate and grow.
- > **The curriculum and delivery of Technology related subjects**, particularly at secondary level, is not meeting the career or progression needs of individuals in relation to higher education or employers. All qualifications should have passed a test of being valued by employers and higher education in order to benefit from public funding.
- > **Promotion of STEM subjects and career paths supported by high quality careers information** is vital. With a simplified qualifications environment, clear progression routes could be explained, encouraging young people to make the most of their capabilities and interests.
- > **Teachers need effective training and resources, supported by industry.** This is a pressing need in IT, where far too many teachers have no relevant qualifications or recent industry experience

This is important to:

- > Help individuals position themselves with valuable qualifications for high quality employment in a high growth, high skill sector with excellent earning potential and career prospects.
- > Support economic growth in Wales by strengthening the pipeline into a strategically important sector in terms of economic recovery and future potential.

We hope our input is valuable to the deliberations of the committee and would be delighted to provide further input if necessary.

## 1. Background to e-skills UK

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e-skills UK welcomes the Enterprise and Learning Committee inquiry into Science, Technology, Engineering and Mathematics (STEM) skills.

As the Sector Skills Council for Business and Information Technology, e-skills UK works on behalf of employers to ensure the UK has the technology skills it needs to succeed in a global digital economy. Our work covers the areas of software, internet and web, IT services, Telecommunications and business change. e-skills UK also takes the lead on the IT-related skills needs of business leaders and managers and of individual workers in all sectors (IT users).

We are an employer-led, not-for-profit company, and were rated as 'outstanding' in the re-licensing review of all Sector Skills Councils by the National Audit Office (NAO) and UKCES. We bring together employers, educators and government to address together the technology-related skills issues no one party can solve on its own and provide advice, services and programmes that have a measurable impact on IT related skills development in the UK.

Our strategic plan for Wales sets out a coherent skills strategy that enables the nation to create the skills needed for a digital economy and to derive maximum benefit from the power of technology to transform competitiveness and productivity.

In relation to this inquiry, our strategic objective to 'Inspire Future Talent' is particularly relevant. We aim to motivate talented students to pursue IT-related careers, better prepare all young people for work in a technology enabled world and enable the influence and support of employers on IT-related learning in schools, colleges and universities in particular through:

- > Improving the understanding of IT-related careers.
- > Ensuring that IT-related qualifications and curriculum meet the needs of Wales operating in the global economy, and are valued by industry, Higher Education and learners.
- > Continuing to support the development of the Welsh Baccalaureate including the integration of Apprenticeships.

## 2. IT & Telecoms in Wales – key facts

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### The IT & Telecoms workforce – underpinning employment in Wales

- > The IT & Telecoms sector comprises over 44,000 people in Wales working in the IT & Telecoms industries and as IT & Telecoms professionals in other sectors<sup>1</sup>.
- > One in every 25 people working in Wales is employed in the sector and the IT & Telecoms industries themselves contribute 5% of Wales's annual Gross Value Added (GVA)<sup>2</sup>.

### The IT & Telecoms workforce growth dynamics and recruitment needs

- > The number of IT & Telecoms professionals employed is forecast to grow ten times the average rate for Wales over the next ten years.
- > More than 3,500 jobs in Wales need to be filled by new entrants moving into IT & Telecoms professional roles.
- > The majority of these new entrants will need to be highly qualified (at degree level or higher) – 58% of current IT & Telecoms professionals hold a qualification at undergraduate level (level 4) or higher.
- > Based on current data, 20% of new entrants (600) will come from education. Graduate entrants are mostly likely to enter Software professional or IT technician roles.

### The supply of skills

- > Since 2004, the decline in students in Wales taking A-level Computing is more than that seen across the UK (a 63% and 52% decrease in numbers respectively).
- > The trend in Wales in the uptake of ICT A-level is the reverse of that seen across the UK. Numbers in Wales taking ICT A-level increased by 164% from 2004 to 2010, whilst across the UK numbers have fallen by 24% over the same time period.
- > Acceptances onto Computing discipline Higher Education courses in Wales declined over the two year period 2002 to 2004 but increased over the following years from the 2004 low of 600 to 790 in 2009. Across all Computing courses in 2009, 85% of acceptances were male and 15% were female.
- > In 2008/09 there were 1,325 Computing and Telecoms degree qualifiers from HEIs in Wales.
- > 60% of new graduates from Welsh HEIs who enter IT & Telecoms professional occupations have IT or Telecoms degrees.

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<sup>1</sup> All data is from e-skills UK, *Technology Counts Wales: IT & Telecoms Insights 2010*, 2010 unless otherwise specified.

<sup>2</sup> ONS ABI GVA 2007 data, for IT & Telecoms SIC 64 (Post & Telecoms) & 72 (Computer Services)

### 3. Response to inquiry areas

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

There are major issues with IT-related education in schools and with the uptake of IT-related subjects in higher education. These issues 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 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, too many IT-related 14-19 qualifications are valued by neither employers nor higher education and therefore add little value to the young people undertaking them.

As a result, employers in the IT industry and employers of IT professionals in all sectors have a very strong interest in improving 14-19 education related to IT. We support linking SSC work to the STEM curricula at primary, secondary and higher education as well as in the vocational sphere.

##### 3.1.1 Schools:

###### **There are widespread concerns about the technology curriculum in schools.**

GCSE curriculum is not appropriate nor are the skills of the teachers delivering the qualification. The Welsh Baccalaureate in IT for 14-19 year old, designed with input from more than 600 employers, universities, colleges and is a gold standard qualification, with full support of HEI'S and employers in Wales- a rich and relevant curriculum. 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. e-skills UK is working with HE and FE, Careers Wales and employers to ensure the trailblazers have the skills and knowledge in order to deliver a gold standard qualification and attract able students to the course. 14-19 networks need to be encouraged to deliver 1<sup>st</sup> class provision, but this requires incentivisation and a robust 'gateway' process to ensure quality delivery of the qualification.

We strongly suggest 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. Employers value courses and curriculum that meets employment needs - as is being done through SQS for post-compulsory education – and we firmly believe the schools curricula should reflect this as well.

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.

###### **Teachers need effective training and resources, supported by industry.**

There would be a clear benefit to teachers delivering IT related GCSEs and A levels of industry influenced CPD. We feel that there is a clear role for SSCs and industry in helping to upskill teachers with industry recognised certification and support, across the education and skills spectrum and have commented further on this in the next section of our input.

In addition, students and their advisors often have an extremely poor understanding of IT-related careers, and young people commonly hold negative misperceptions as a result. There is a need for young people and their parents to be able to make informed decisions (through IAG) and having the support to enter the profession.

CC4G is an established intervention at year 6 that addresses issues that exist with that age group. However CC4G does not fall within 14-19 policy and is therefore 'out of the policy and funding loop'. Higher education, further education, employers and the Wales BCS (professional body) recognise the issues identified by e-skills UK research and are working with us in Wales

to fund and support CC4G. However, central funding for a three year term would help to accelerate take up and address the skills needs and gender issues the sector faces.

### 3.1.2 Further education / WBL / Apprenticeships

New data from the Lifelong Learning Wales record for 2008/9 shows there were 6,250 people categorised as taking IT & Telecoms professional type courses in Wales, mainly through FE. However, analysis of previous year's data shows that the majority of learning is below Level 3, the accepted entry level for IT & Telecoms occupations.

Employers believe that Modern Apprenticeships (MA) are the way forwards in Wales for vocational education and e-skills UK is working with WAG to develop new frameworks. We have recently been commissioned to deliver the shared MA programme via the Sector Priorities Fund (SPF). This is an innovative MA that is created to support the SME market needs whilst giving young people the opportunity to earn, gain work experience and achieve nationally recognised qualifications.

We are also working with WAG to develop a pathways programme so that colleges can provide a one year MA programme within FE that can create a pool of talent in Wales that can either enter employment or further training.

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. Finding a simplified and empowered approach for SSCs and employers would enable the growth of Apprenticeships in the sector and provide progression routes to higher level skills.

### 3.1.3 Higher Education

There are a range of reasons why STEM graduates do not progress to STEM jobs and we suggest that the findings of the forthcoming BIS report on STEM graduates not in STEM jobs will be worth consideration in the Welsh context. For example, 53% of Computing grads 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 we suggest 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.

For example, methods trialled in the ITMB degree, such as employer open days, mock interview sessions and CV writing could encourage and facilitate the transition from STEM education (whether undertaken at University, college or school) to STEM occupations.

e-skills UK is working with HEIs in Wales to deliver IT related higher education valued by employers. The ITMB degree will be piloted by Glamorgan from September 2011 and the e-skills UK internships programme has just commenced in Wales. We are also planning to introduce ITMB foundation courses in partnership with 3 HEIs.

### 3.2 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.

#### Funding

There is concern among technology businesses that the 'T' in STEM is seldom given the weight it deserves in government STEM policy. The recent Council for Industry in Higher Education (CIHE) report, *'The Fuse'*<sup>3</sup> quoted Bill Mitchell, Director of BCS, the Chartered Institute for IT as saying:

*"Information technology and computing enable almost everything we do in modern society, which is especially true in the creative and digital industries. The incredible advances in computing we've seen in recent history represent some of the greatest intellectual achievements of the human race. Yet within STEM, computing and IT are often overlooked when funds are allocated because they are hidden within the achievements they've made possible in other disciplines."*

Despite IT & Telecoms being recognised by WAG as a priority sector, little funding is available for the sector currently. For example:

- > CC4G relies on schools and HEI'S 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
- > HEFCW supports projects to address issues of student demand for STEM subjects but has concentrated on chemistry, physics, engineering and maths.

We wonder whether funding could be used to incentivise choices in STEM subjects of most value to the economy in Wales. As set out above 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 Strategy.

#### Is current supply meeting the needs of the Welsh Labour Market?

Less than one in twenty Welsh firms seeking to recruit IT & Telecoms professionals during the final quarter of 2008 stated there were experiencing difficulties finding applicants with the right skills, qualifications or experience and the number of Computing qualifiers from Welsh HEIs is now rising.

However, the IT & Telecoms sector in Wales is predicted to grow strongly to 2018, primarily at higher skills levels. In addition to catering for continued growth, recruitment into IT & Telecoms roles needs to address 'replacement demand'.

A recent CBI survey<sup>4</sup> found that the quantity and quality of graduates is a pressing issues in STEM related industries where two thirds (66%) of employers in science/hi-tech and IT industries are calling for the numbers and quality of science, technology, engineering and maths (STEM) graduates to rise. In particular, 58% of scientific, high-tech and IT businesses looking to recruit STEM graduates found graduate employability skills lacking.

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<sup>3</sup> CIHE, *The Fuse: Igniting High Growth for Creative, Digital and Information Technology Industries in the UK*, September 2010

<sup>4</sup> CBI, *Ready to grow: business priorities for education and skills Education and skills survey 2010*, 2010

e-skills UK research<sup>5</sup> showed that graduate technical skills tend to match employer expectations. However, the research shows a clear need to enhance graduate abilities to deploy their skills in a business context and to further develop their interpersonal skills for communicating with teams, clients and sub-contractors.

See also Section 2 above.

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<sup>5</sup> Experian/ e-skills UK, *Researching Graduate Employment in IT*, 2009



### 3.3 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.

In addition to curriculum reform, employers feel that activities such as STEM professional development, teacher knowledge and skills confidence could be more industry influenced.

There is little data available to us on the extent of the STEM teacher workforce and their skills needs in Wales but we know from research conducted in England<sup>6</sup> that for Year groups 7 – 13:

- > 23% of teachers are qualified at degree level in IT (compared to 47% of Maths teachers and 62% of English teachers in the respective subject area)
- > Only 55% of lessons were delivered by teachers with relevant post A-level qualifications, with 30% of lessons taught by those with degree level IT. Conversely and critically, 45% of periods are taught by those with no post 'A' level qualification.
- > Generally across all subjects, higher year groups were more likely to be taught by better qualified teachers however, in IT related subjects (and in direct comparison to other STEM subjects such as Maths and Chemistry), this is not evident.

An extract from the "Science and mathematics Secondary Education for the 21st Century Report", Science and Learning Expert Group, 2010 says *"Teachers and technical staff must also be provided with the necessary development throughout their teaching career to enable them to teach most effectively. Continuous professional development (CPD) is central to effective career development for all teachers. Subject specific CPD is especially important for STEM teachers who need to keep up with the latest developments in their fast-moving subject areas. Both teachers and technical staff need continuing support and updating to develop excellent practical classes and demonstrations for their pupils"*

Indeed, in the Welsh Baccalaureate IT CPD issues have been highlighted as barrier to success CC4G is helping to address this issue giving teachers access to a rich curriculum.

The Skills Commission inquiry into Teacher Training in Vocational Education found that: *"to overcome the vocational deficit in the school workforce we need to ensure teachers have access to CPD and opportunities to top up and update their subject specific knowledge and technical understanding"*.

We 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 DfE, Vital provides top class continuing professional development for teachers specialising in technology (IT/Computing/ICT) 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.

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<sup>6</sup> e-skills UK research for the specialist ICT Teacher CPD framework, April 2010



### **3.4 The effectiveness of education and business links between education institutions and STEM employers.**

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.

Employers are extremely keen to work together via e-skills UK to support change in education. This offer includes supporting curriculum and qualification design, course delivery, the creation of teaching resources and teacher professional development.

Employers in the IT sector already have a track record with e-skills UK in this area and the e-skills Wales employer forum (see Annex A for membership) is fully committed to ensuring that education and business links are enhanced further. e-skills UK has gained recognition that our work with Careers Wales, IAG advisers and EBP staff via CC4G and the Welsh Baccalaureate in IT is a model of good practice. e-skills UK would be delighted to share good practice with the aim of having a consistently high quality approach throughout Wales.

e-skills UK is currently exploring opportunities to capitalise on existing experience and following our 'Delivering Digital Wales' event in September we've gained 100% support from Careers Wales, HE and FE in Wales. The Wales employer forum has endorsed the concept of a Wales specific website for promoting IT opportunities and have agreed to provide content.

### **3.5 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)'.**

We welcome opportunities to continue to develop our work with HEIs, FE and schools within the policy context via our action plan for Wales.

We 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.

We would welcome funding to deliver the "T" in STEM aligned to the overall STEM policy 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.

## Annex A Wales Employer Board List

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Ronan Miles	Director of Collaborative Solutions Practice, BT Client Services	BT
Chris Goldoni	Director	Cardiff Financial Partnership
Penny Copner	Coordinator	Care sector
Richard Sheppard	Director	Draig Technology
Mike Greenway	Senior Commercial Consultant	EADS
Alan Pound	Wales Manager	Fujitsu
David L Morgan	Delivery Manager	HP Services
Ian Clark	Engineering Operations Manager & Head of Configuration Management	General Dynamics
Cenydd Burden	Head of EMEA Client Services	Mitel
Christine Bamford	Director of OD	NLIAH
Jo Preece	Wales Manager	Steria
Greg Jones	Head of Corporate Services	DFTSSC
Terry Killer	Skills Manager	Microsoft
Gwyn Thomas	CIO	Welsh Assembly Government
Rick Cooper	Director Alactel-Lucent University	Alcatel Lucent
Nia Davies	Policy Officer	Federation of Small Business

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