Digital Skills Taskforce call for evidence

Submission from the UK forum for Computing Education (UKforCE)

We have answered below the questions from the taskforce call for evidence which we believe to be most relevant to the remit of UKForCE – i.e. questions 1-4 and 6-9.

1. **What digital skills are most urgently needed? What are the digital skills that will be needed in the future?**

Much analysis of the requirements for digital skills in the UK workforce starts with an analysis of jobs in the IT and telecommunications sectors. We believe this to be a fundamentally flawed starting point in a world where 'every business is a digital business' is an increasingly valid mantra. As an alternative starting point we have considered each of the 361 Standard Occupation Codes for which the government publishes an estimate of the number of full time and part time workers. These SOCs cover the entire c.29M people in the UK currently in employment, ranging from Chief Executives to manual workers such as shelf packers and farm labourers. For each SOC we have made a judgement, looking forward 2-3 years, as to the fractions of that SOC workforce for whom day to day tasks require the following skills:

Digital Muggle: No digital skills required – digital technology may as well be magic.

Digital Citizen: the same work skills as are required to be a full digital citizen. This is the ability to use digital technology purposefully and confidently to communicate, find information and purchase goods/services.

Digital Worker: substantially more digital skills than those required for full digital citizenship but less than those of a Digital Maker. This includes, at the higher end, the ability to evaluate, configure, and use complex digital systems. Elementary programming skills such as scripting are often required for these tasks.

Digital Maker: skills to actually build digital technology (typically software development). The Digital Maker category is interpreted quite broadly to include, at the low end, for example, workers who regularly create complex Excel macros or data files for controlling 3D printers.

This analysis and the conclusions below are considered in more detail in blog posts shortly to be added to the UKForCE website. The headline numbers are as follows:

Digital Muggle: 2.2M
Digital Citizen: 10.8M
Digital Worker: 13.6M
Digital Maker: 2.9M

The clear conclusions from these numbers are that:

a) Almost everyone in the workforce will soon need the skills of digital citizenship to do their job, notwithstanding their need for those skills in order to engage more broadly with society and government.
b) Well over half the workforce (Digital Workers + Digital Makers) need digital skills significantly beyond those required for digital citizenship.

The specific skills needed by Digital Workers and Digital Makers are extremely diverse depending on sector, SOC and business practices of particular employers. These skills range from financial modelling, content creation and social media analysis through to chip design and big data science. The sheer diversity of these vocational needs makes it impractical and unhelpful to teach specific vocational digital skills at school. Our workforce requires a foundational understanding of digital technology that can underpin and facilitate the acquisition of many different vocational digital skills, in a world where digital evolution will be extraordinarily fast. Moreover, this evolution will be periodically punctuated by changes that are truly revolutionary rather than evolutionary. It should be remembered that the internet, mobile phones and identification of the human genome have all happened during the working life of very many people still in employment today.

For the more expert Digital Makers, the necessary foundational skills will be acquired at A Level and through Computer Science degrees. However, for the majority of Digital Workers and Digital Makers, the high quality teaching of a rigorous Computing curriculum, such as the one being introduced in England in September 2014, is the appropriate way to lay the groundwork for these future careers.

A good computing education at school is in many ways akin to the 3 Rs. It is a deep skill which will be necessary to fully exploit the new digital environment as it continues to change at a remarkable speed.

Over the coming years we expect a trend toward greater 'digital self-sufficiency' in many jobs within an organization. Historically organisations used to have typing pools which have been made largely obsolete by other workers preferring the often more timely approach of creating and formatting their own documents. Similarly, many workers now use technology to manage their own diaries, rather than relying on a PA or secretary. Self-sufficiency is facilitated by technology and results in more nimble organisations. Start-up companies, particularly in the tech sector now commonly have an entire workforce that is completely digitally self-sufficient. That is, everyone has the digital skills necessary to select, install, use and even modify/enhance all the digital tools they require. There is no need for recourse to a central IT function. This trend favours, sometimes to the exclusion of other candidates, those with Digital Maker skills. In other words, across the entire workforce we expect to see a significant increase in the 2.9M Digital makers. We believe that as many as 25% of the Digital Worker community would already benefit from some Digital Maker skills, improving the overall agility and effectiveness of their employer. This corresponds to more than doubling the 2.9M estimate of the number of people requiring Digital maker skills to over 6M if this trend toward digital self-sufficiency continues.

2. How can perceptions of digital careers be improved? How can we help students, parents and teachers better understand the breadth of opportunity and the different entry points?

Key activities that can help here include:
- Opportunities for teachers to spend time in commercial organisations either on short term assignment or simply shadowing employees performing various roles to better understand the digital skills needs of the workforce and the sorts of jobs that are available for candidates with strong digital skills
- Employers working more closely with schools and FE colleges, with programmes like STEMNET Ambassadors, providing workshops for teachers and pupils highlighting the opportunities and associated skills needs

EngineeringUK, the organiser of The Big Bang Fair, should be encouraged to increase the profile of digital skills within the event as a whole and potentially work with organisations from sectors other than IT/telecommunications to illustrate interesting applications of digital technology in their sector. For example, ASOS are a heavy user of eCommerce software and Ocado have some very impressive robotics to automate the fulfilment of grocery orders. In other words, there are opportunities to exploit digital skills in organisations that students may find interesting because of the underlying purpose of the business (e.g. fashion). Illustrating the innovative use of digital technology in businesses that are not intrinsically digital maker businesses could attract a previously uninterested group of students.

3. **What responsibility do businesses have in helping to improve digital skills across every age group?**

Focusing on the 5-19 year old age group, in line with the UKForCE remit, all businesses have a strong responsibility to make students aware of the career opportunities available in their organisations for people with particular digital skills. This information should be appropriately provided at all points in the learning pathway where students make learning choices:

- Before KS4
- Before A Level or FE College
- Before going to university
- At university.

Employers can help make this information available through:

- Visiting schools, colleges and universities
- Offering short work experience and shadowing opportunities to teachers
- Offering work experience and internships to pupils and students .

Employers can also make a substantial difference by encouraging their workforce to volunteer for after school clubs such as Apps For Good and Code Club. Most employees are, after all, also parents and there is already a real momentum behind these after school activities.

4. **How can schools ensure students acquire the digital skills and understanding they will need in the future? What support is needed? What are the tripwires? How can schools make better use of technology in and out of the classroom?**

The most important thing schools can do is effective and engaging delivery of the new Computing curriculum. For this to happen, almost all schools need to provide substantial CPD for all teachers tasked with delivering elements of the Computing curriculum. It is hard to see how this can be done within schools existing CPD budgets and therefore government has a responsibility to provide extra funding over the next 5-10 years to up skill the existing teacher workforce. We believe an additional £20M would make a major difference, spread over the period in which government realistically expects the new curriculum to be fully adopted. This would be around £1,000 per school, which is still a very modest amount to fuel such a step change. Allied with extra funding, there also needs to be an effective assessment regime, which on the one hand ensures effective delivery but on the other hand does not disincentivise schools in what is inevitably going to be a challenging transition for many schools.

Tripwires include:
- Lack of sustained government support for the new Computing curriculum. This new curriculum is a radical change, and its effective adoption will not be accomplished in a single year; it will take a decade to become firmly established. If government attention moves on, and treats the Computing curriculum as "done" there is a serious danger that it will be still-born.
- Inadequate CPD resulting in teachers tasked with the responsibility but without the knowledge or confidence to deliver, resulting in demotivated teachers and poor pupil attainment
- Unimaginative delivery of the curriculum to tick the box which does not engage the pupils
- An insufficient in-flow of properly qualified specialist teachers coming through ITT – this is particularly problematic where the ITT trainers are not themselves Computing specialists
- Use of teaching staff for whom Computing is not their primary discipline and who regard this as a burden rather than an opportunity.

 Use of technology in and out of the classroom is outside the UKForCE remit, but nonetheless, it is essential that technology is seen as naturally underpinning all aspects of the school's operation and the teaching of all subjects, rather than something which is in some sense separate from daily life. Such deep integration of technology into the school is essential if we are to produce a 'digitally intuitive' population.

After school clubs such as Apps For Good and Code Club have a valuable role to play in engaging and stretching pupils and schools should work with industry volunteers to offer such clubs, which should where possible strengthen and augment topics taught through the formal curriculum.

5. **How can we encourage better use of technology across all stages of education to teach students better, enrich their learning and improve efficiency?**
   [This is outside the scope of UKForCE]

6. **What needs to be done to ensure that the new computing curriculum in England is successfully implemented?**

See Q4. In the short term more funding to allow schools to properly undertake Computing CPD is critical – we suggest a minimum additional budget of £20M. This must be allied with a strong focus on bringing more specialist Computing teachers through ITT. In the latter case the availability of Computing ITT scholarships on a par with other shortage subjects is very welcome. The challenge now is to convince students with highly employable and well remunerated Computing degrees that teaching is a desirable and worthwhile career. Teach First may have a role to play in this regard.

7. **What role can apprenticeships play in boosting the UK's home grown talent for digital skills? What would a really good apprenticeship in digital skills/IT look like? What would help companies of all sizes offer apprenticeships?**

Apprenticeships are potentially the best and most appropriate way to provide a large proportion of the Digital Worker group with vocational training. This is also true for a reasonably large fraction of the Digital Maker group, provided that the apprenticeship:

- Is preceded by strong foundational learning in KS1-KS4
- Continues to combine theory of computing and IT Principles with specific vocational knowledge.

Employers will be encouraged to offer more and higher quality apprenticeships by:
- Changing the current perception that apprenticeships are for those pupils who are not strong enough for university
- Encouraging schools to discuss the apprenticeship route with their stronger pupils
- Providing case studies from early adopters illustrating the benefits for employers and apprentices as compared to employees who have followed the more traditional HEI route and entered employment as a graduate, albeit not a graduate with relevant vocational skills
- Funding apprenticeships that combine theory with product/vendor specific training – this will allow employers to allocate training budgets towards the costs of apprenticeships that would otherwise be used on product/vendor specific training
- Offering particular help (possibly financial) to SMEs – traditionally where very many craftsmen learned their trade, but currently not obvious candidates to provide digital apprenticeships.

There is an issue with 'digital apprenticeships' as compared to learning a traditional trade either as an apprentice or an articled clerk. In today's businesses, the digital skills are necessary for, but not the primary function of the employer. A plumber would typically learn their trade working for a master plumber and follow a path towards being a master plumber and often a business owner. Perhaps a better analogy for a digital apprenticeship is a cost accountant or HR person. Every business needs them, but, unlike plumbing, cost accountancy and personnel are not the revenue generating functions of the business. We should bear this difference in mind when structuring digital apprenticeships otherwise they will only be offered by companies in the IT/telecommunications sectors, for whom the apprenticeship is likely to lead directly to revenue generation opportunities.

8. **How can further education and higher education better equip students with the digital skills which are needed?**

FE colleges should work with employers to understand what skills are most relevant to specific sectors and consider offering qualifications that combine a significant amount of digital theory and practice alongside the sector specific knowledge. For example courses in 'Hospitality and ICT' or 'Retail and eCommerce Technology' may be appealing qualifications for those specific sectors.

HEIs are outside the remit of UKForCE, however, the historical preference of HEI Computer Science departments for Maths, Physics and Further Maths A Levels rather than, say, Maths, Physics and Computer Science will not be helpful moving forward. As the rigour of Computing education in our schools improves we must close the loop with HEIs so that the strongest pupils are encouraged to take CS A Levels, in turn leading to stronger and better qualified pupils entering degree courses in Computer Science. The need for undergraduates in all STEM disciplines to have good Computing skills argues for this principle to go beyond Computer Science departments, with a Computer Science A Level being in principle an excellent pre-cursor to any STEM degree.

9. **How can careers guidance at every stage be improved to ensure that people receive the necessary information, advice and guidance to help them make informed choices? Who should deliver this advice and how?**

See Q3 for consideration of employer engagement in careers advice and guidance.

Schools also have a moral duty to reach out to employers for this help in guiding their pupils into effective learning pathways. Government also has a role in ensuring that school performance measures do not result in advice from teachers that is less than impartial. For example, if a school is measured on the number of university entrants this might discourage guiding pupils towards digital apprenticeships.

About UKforCE

UKforCE was established as a recommendation from the Royal Society 2012 *shutdown or restart* report. UKForCE brings together representatives from across the communities of education, computer science, digital media, IT, engineering and telecommunications. The body is independent of government and awarding organisations and works towards improving computing education across all education sectors of the UK.

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