Government Office for Science

Foresight

Evidence from the Lifetime Learning in the Digital Age Summit

Future of Skills & Lifelong Learning: Workshop Report

Foresight, Government Office for Science

Contents

Executive summary

- Digital skills are increasingly required for citizens to engage effectively in modern societies. Digital technologies can transform the provision of public services, but may require new skills to use them. Digital skills provide benefits for employment and social mobility. They are important for the productivity of UK firms generally, and the digital and creative sectors specifically. In turn this affects the international competitiveness of the UK and regional growth.
- Digital skills are currently stratified in the UK. Older people have lower digital skill levels than younger people. Women are underrepresented in the ICT profession. 40% of individuals with no qualifications have used the Internet, compared to 95% with higher education qualifications.
- These differences may be compounded because lifelong learning is generally taken up by those who are young, middle-class, well-qualified, in employment and have parents who experienced extended education.
- Whilst likely to be essential, it is hard to predict the exact nature of digital skills in the future: *"We are currently preparing students for jobs that don't yet exist, using technologies that haven't been invented, in order to solve problems we don't even know are problems yet."*[1]
- Rather than trying to predict future digital skills, a resilient policy approach can start by addressing gaps in digital skills provision and attainment.
- The need to update digital skills will be on-going as new technologies continue to arrive. A resilient policy approach can build the foundations for lifelong learning across the population.
- It is likely that coordinated interventions will be required across the digital skills landscape. Schools, colleges and universities supply employers with workers who possess differing levels of digital skills and interest in lifelong learning. Different interventions will be required for those already in the workforce.
- Businesses and employers set expectations for digital skills through recruitment. They upskill (or do not upskill) employees, and should make use of their employees' digital skills through efficient and effective work practices. Improving UK digital skills requires collaboration between the organisations that demand and use digital skills, as well as those who supply them.
- There are still important limitations and gaps in the evidence base that require further research. A research agenda should focus on how to build lifelong learning across the population, how to codify and accredit learning outside of the formal education system and how to make digital skills provision more responsive to demand.

[1] Quote from former U.S. Secretary of Education Richard Riley.

Introduction

Technology and skills are interrelated and there are a number of lenses for understanding this relationship. There are varying estimates of the extent to which technology will replace skills in the future. There are a growing number of organisations using education technologies or 'ed tech' to help skills acquisition at all stages of the life course. Related to both these, British citizens will require different types of digital skills in the future to work effectively and be full participants in society. The Government Office for Science worked with the Department for Culture, Media and Sport (DCMS) and industry representatives to advance understanding of future digital skills at a specially convened *Lifetime Learning in the Digital Age Summit* at the Design Council in July 2016.

This report includes evidence discussed at the Summit, referenced appropriately. The Government Office for Science and DCMS worked with the Cabinet Office's Policy Lab[2] team to employ an 'open policy making' approach to generating ideas with attendees[3]. These suggestions and ideas are included towards the latter part of the report.

The report is organised into five sections:

1. Current digital skills requirements
2. Gaps in digital skills provision/attainment
3. Future digital skills and the impact of technology
4. Roles key actors can play
5. Limitations and gaps in the evidence base that require further research

[2] For more information on Policy Lab see: https://openpolicy.blog.gov.uk/category/policy-lab/

[3] For an overview of open policy making methodologies, see: Kimbell, L. (2015). Applying Design Approaches to Policy Making: Discovering Policy Lab. University of Brighton https://researchingdesignforpolicy.files.wordpress.com/2015/10/kimbell_policylab_report.pdf

1. Current digital skills requirements

Most definitions of digital skills include three 'tiers', for example:

- Basic digital literacy skills: skills needed by every citizen to become 'digitally literate'. These are the skills needed to carry out basic functions such as using digital applications to communicate and carry out basic Internet searches.
- Digital skills for the general workforce: all of 'basic digital literacy skills', plus skills needed in a workplace. While these digital skills are likely to differ between sectors, some minimum requirements linked to processing information will be applicable across all sectors.
- Digital skills for ICT professions: all of 'basic digital literacy skills' and 'digital skills for the general workforce', plus skills needed for the diverse IT sector. They include digital skills linked to the development of new digital technologies, and new products and services[4].

Digital skills – or their absence – impact society in a variety of ways. They are required for **basic citizenship and engagement with society**. This could include carrying out essential tasks like finding information and purchasing goods/services. Lack of such skills can lead to exclusion from society[5].

Digital technologies can transform the **provision of public services**. Recent studies show that a third of those learning Basic Digital Skills made fewer visits to a doctor after learning about online health resources such as NHS Choices. Scaling up this effect, basic digital skills across the population would result in NHS savings of £121 million a year by 2025[6]. Savings could be made at the local level: the Local Government Association record that in 2012 the average 'cost of contact' across 120 local councils for online transactions was £0.15 compared to £8.62 for face-to-face[7]. There are wider health benefits from technology, for example technology-enabled care services such as home-–health monitoring tools. However, without a basic level of digital skills across the population, there is a risk that the potential of technologies to support health will not translate to those with highest need, exacerbating health inequalities[8].

Economists have calculated the monetary value of 100% of the population having basic digital skills. These have been split between benefits to the government and benefits to the user, and are shown in Figure 1. Whilst the public benefits of digital skills are important, individual benefits are greater and include **time, employment and earnings benefits**. 90% of all new jobs require digital skills, with 72% of employers revealing that they would not interview a candidate who does not possess basic computer skills[9]. 25% of UK job vacancies are only posted online[10]. In turn, employment

[4] ECORYS (2016) Digital Skills for the UK Economy https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/492889/DCMSDigitalSkillsReportJan2016.pdf
[5] UK Digital Skills Taskforce (2014) Digital Skills for Tomorrow's World http://ukforce.org.uk/wp-content/uploads/2014/07/Digital-Skills-for-Tomorrows-World.pdf
[6] Cebr (2015) The economic impact of Basic Digital Skills and inclusion in the UK: A report for Tinder Foundation and GO ON UK http://www.tinderfoundation.org/our-thinking/research-publications/economic-impact-basic-digital-skills-and-inclusion-uk
[7] LGA (2014) Local Government in the Digital Age http://www.local.gov.uk/documents/10180/11515/Local+government+in+the+digital+age+%28Need+to+know+Knowledge+Navigator+number+3%29/544d1515-3483-4a58-8da4-da92eca6126b
[8] Foresight (2016) Future of an Ageing Population https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/535187/gs-16-10-future-of-an-ageing-population.pdf
[9] Cebr (2015) The economic impact of Basic Digital Skills and inclusion in the UK: A report for Tinder Foundation and GO ON UK http://www.tinderfoundation.org/our-thinking/research-publications/economic-impact-basic-digital-skills-and-inclusion-uk
[10] House of Lords Select Committee on Digital Skills (2015) Make or Break: The UK's Digital Future https://www.publications.parliament.uk/pa/ld201415/ldselect/lddigital/111/111.pdf

affects the **welfare bill**: Figure 1 estimates the Job Seekers Allowance savings and increased tax and National Insurance receipts from universal basic digital skills[11].

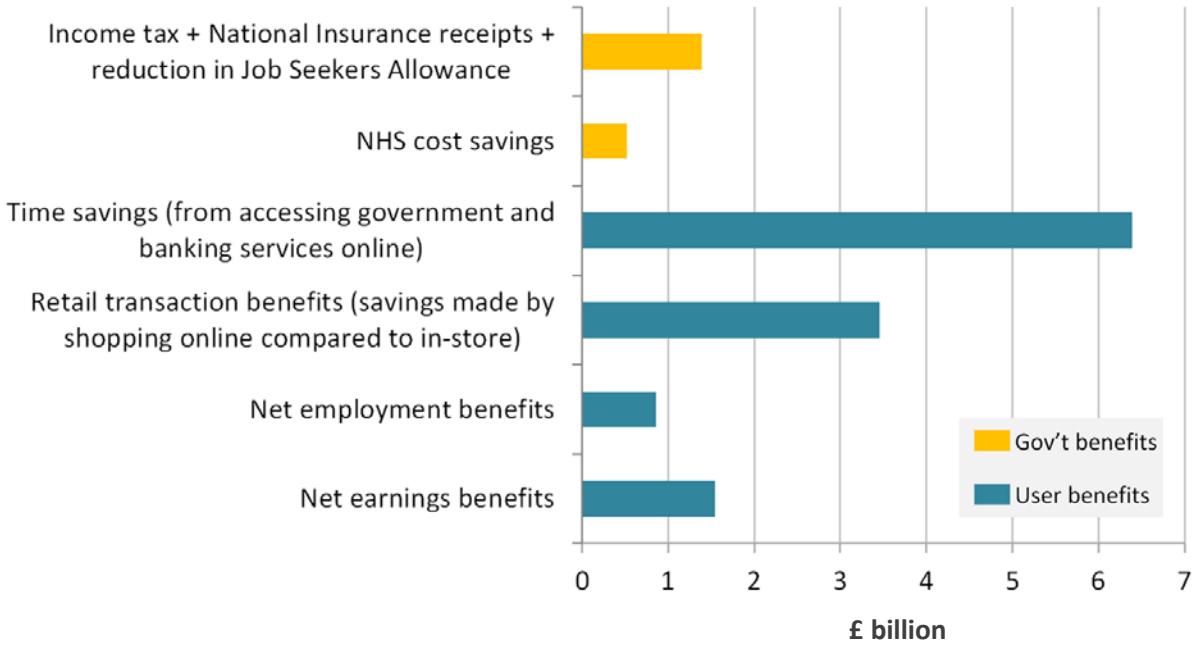

Figure 1: Benefits to the UK economy of equipping 100% of population with basic digital skills: monetised, accrued over ten years from 2016-2025 subject to 3.5% discount rate (£ billion in 2014 prices)[12]

Digital skills are important for the **productivity of UK firms and regional growth**. Skill shortages threaten productivity gains from digital technologies in half of UK companies.[13] This is likely to adversely affect the international competitiveness of UK firms. There is a strong regional dimension to this. Figure 2 shows that the percentage of adults without basic digital skills is highest in Wales (38%), West Midlands (37%) and Northern Ireland (35%)[14].

[11] Cebr (2015) The economic impact of Basic Digital Skills and inclusion in the UK: A report for Tinder Foundation and GO ON UK http://www.tinderfoundation.org/our-thinking/research-publications/economic-impact-basic-digital-skills-and-inclusion-uk
[12] Ibid.
[13] Tech Partnership (2015) https://www.thetechpartnership.com/news-events/news/employer-insights/
[14] Ipsos Mori (2015) Basic Digital Skills: UK Report 2015 http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Basic-Digital-Skills_UK-Report-2015_131015_FINAL.pdf

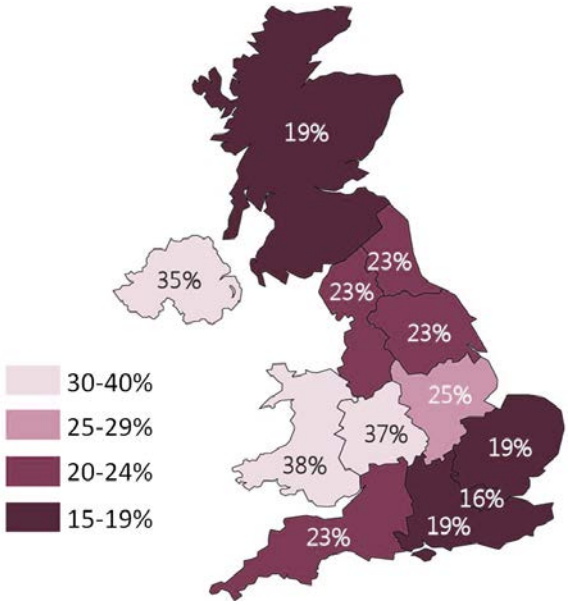

Figure 2: Percentages of adults without basic digital skills across the UK[15]

The impact of digital skills shortages may be most acute in the **competitiveness and growth of digital and creative sectors**. These sectors create jobs 2.8 times quicker than the rest of the economy (based on 2011-14 data) and grow 32% faster than the rest of the economy (based on 2010-14 data)[16]. However, 59% of tech firms suffer from gaps between the skills held and skills needed[17]. 43% of digital tech businesses cite access to talent as a challenge to growth. This poses a greater challenge than access to finance (cited by 39% of businesses), digital infrastructure (28%) and regulatory issues (11%)[18]. Digital skills shortages are growing (see Figure 3).

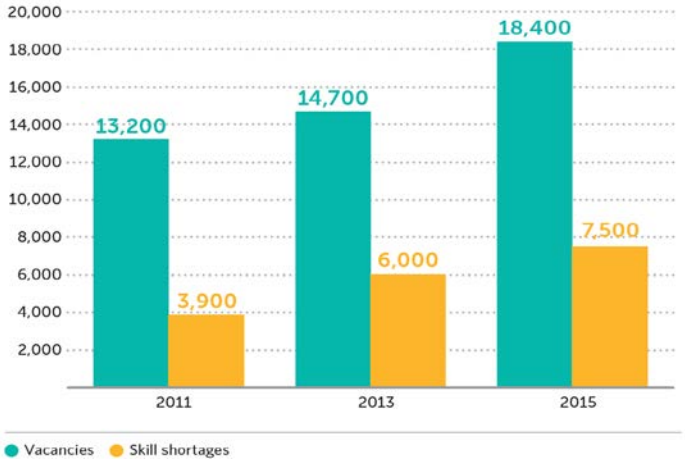

Figure 3: Number of vacancies and skills-shortages vacancies for information technology and telecommunications professionals (where skills-shortage vacancies are defined as vacancies which are proving difficult to fill due to the establishment not being able to find applicants with the appropriate skills, qualifications or experience)[19]

[15] Ibid.
[16] Tech Nation (2016): Transforming UK Industries http://www.techcityuk.com/wp-content/uploads/2016/02/Tech-Nation-2016_FINAL-ONLINE-1.pdf
[17] Tech Partnership (2015) https://www.thetechpartnership.com/news-events/news/employer-insights/
[18] Nesta and Tech City UK (2016) Tech Nation 2016 http://www.techcityuk.com/technation/
[19] UKCES (2016) UK Commission's Employer Skills Survey 2015: UK Results https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525444/UKCESS_2015_Report_for_web__May_.pdf

Summary: digital skills are broadly defined and affect all aspects of society:

- basic citizenship and engagement with society, including access to public services;
- employment and earnings, with implications for the welfare bill;
- productivity of UK firms and regional growth;
- competitiveness and growth of digital and creative sectors.

2. Gaps in digital skills provision/attainment

Differences in skills levels manifest spatially and according to age, gender, ethnicity, disability, and socio-economic status. Some groups face particular challenges in developing their digital skills, which contributes towards a national skills gap.

There are regional differences in Internet usage. Proportions of non-Internet users are highest in the north of England, Wales, and parts of Scotland and Northern Ireland[20]. Digital exclusion can be exacerbated by lack of broadband coverage[21]. This not only affects the abilities of already-disadvantaged groups to develop skills, but can also prevent tech professionals from developing skills and deter them from locating firms in areas of Internet inaccessibility.

Socio-economic status and educational levels are both positively correlated with Internet use: 40% of individuals with no qualifications have used the Internet, compared to 95% with higher education qualifications[22]; 70% of lower socio-economic classes DE has used the Internet at home compared to over 90% for ABC1 (see Figure 4)[23]. **Older people** are also less likely to use the Internet, and this is associated with lower digital skills: 79% of 65-74 year olds had 'low' or 'no' Internet skills in 2013, compared to 51% of all individuals[24]. **Women** are underrepresented in the ICT profession[25] and represent 13% of Computer Science first degree entrants[26].

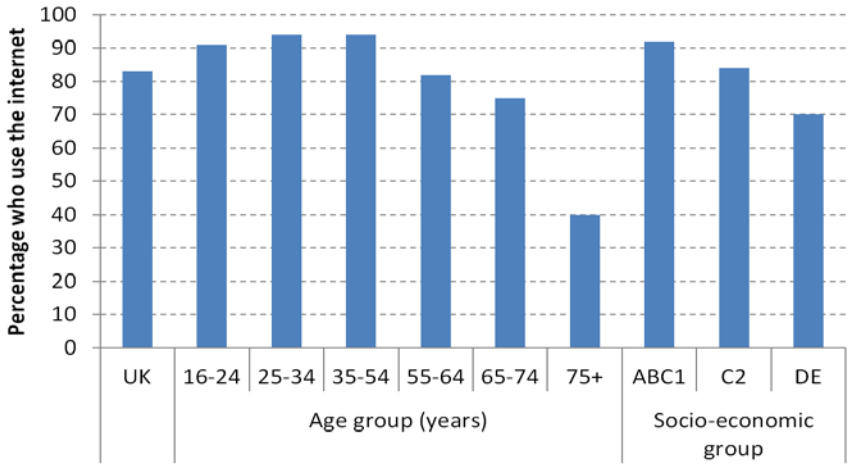

Figure 4: Home Internet access in 2015 by age and socio-economic group[27]

[20] ONS (2014) Internet Access Quarterly Update, Q1 2014 http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171778_362910.pdf
[21] Doteveryone (2016) Heat map showing likely levels of digital exclusion across the UK. https://doteveryone.org.uk/resources/heatmap/
[22] Dutton W and Blank G (2013) Oxford Internet Survey 2013 Report http://oxis.oii.ox.ac.uk/wp-content/uploads/sites/43/2014/11/OxIS-2013.pdf
[23] Social grades are described by the National Readership Survey, and include: [Social Grade] A: High managerial, administrative, or professional; B: Intermediate managerial, administrative and professional; C1: Supervisory, clerical and junior managerial, administrative and professional; C2: Skilled manual workers; D: Semi-skilled and unskilled manual workers; E: State pensioners, casual and lowest grade workers, unemployed with state benefits only. See http://www.nrs.co.uk/nrs-print/lifestyle-and-classification-data/social-grade/
[24] Knapp M. (2015) What are the likely changes in society and technology which will impact upon the ability of older adults to maintain social (extra-familial) networks of support now, in 2025 and in 2040? https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/463263/gs-15-6-technology-and-support-networks.pdf
[25] Tech Partnership (2015) The Women in IT Scorecard https://www.thetechpartnership.com/globalassets/pdfs/research-2015/womeninit_scorecard_2015.pdf
[26] Shadbolt N (2016) The Shadbolt Review of Computer Science Degree Accreditation and Graduate Employability https://www.gov.uk/government/publications/computer-science-degree-accreditation-and-graduate-employability-shadbolt-review
[27] Ofcom (2015) The communications market report. https://www.ofcom.org.uk/research-and-data/cmr/cmr15

New digital skills can be acquired by learning throughout life. Adult learners are disproportionately young, middle-class, well-qualified, in employment and have parents who experienced extended education[28]. Early-life education is the best predictor of later participation in education[29]. These reinforcing factors may 'lock-in' the existing stratification of digital skills in the UK in the future.

Summary: digital skills are currently stratified in the UK. Digital skills levels are different for different population groups, including older people, those from minority groups and different UK regions. The existing stratification of digital skills could, without intervention, be locked-in in the future.

[28] Tuckett A (2016). Learning across the lifetime - Informal learning in the family and community
[29] Tuijnman A (1991) Lifelong education: A test of the accumulation hypothesis. International Journal of Lifelong Education, 10(4), pp.275-285

3. Future digital skills and the impact of technology

Digital skills are likely to be essential in the future, yet it is hard to predict the nature of them because of the pace of technological change. LinkedIn compared job titles in the profiles of their 259 million members between 2008 and 2013, and found that the fastest growing jobs include big data architects, user experience designers, data scientists, and digital marketing specialists – jobs which in some cases did not exist a few years ago[30]. One million new people are forecast to be required for specialist digital roles by 2023[31]. However, even those in the digital sector do not have the right software skills because requirements change so quickly[32]. There is uncertainty in the future of programming jobs as technologies such as 'software-as-service' could remove the need for in-house IT departments to develop solutions. Attendees at the *Lifetime Learning in the Digital Age Summit* cautioned against trying to predict exact future digital skills because of the pace of technology.

Other trends may affect the population's digital skills in the future. For example, the proportion and absolute number of older people will increase over the next 20 years[33]. If there continues to be a gap in skill levels between the over-60 and under-60 groups, this could result in more people being excluded from the latest technologies. Employer investment in the workplace has been declining. The provision of formal work-based training declined from 2001 to 2012[34], and real-terms investment has declined[35].

Technology and social trends are also opening up new ways to provide and acquire digital skills. These opportunities could be both more cost-effective and inclusive than previous ways. Massive open online courses (MOOCs) provide a flexible way for more individuals to develop skills. Worldwide sign-up to MOOCs doubled between 2014 and 2015 to 35 million, with completion at around 10%[36]. More generally, 79% of adults use technology to learn informally. 45% of employers used online training/e-learning in 2015, a net increase of 21% on the previous year[37]. Learning outside of the formal system presents opportunities for an individual to acquire new skills and further their prospects in the workplace. Rates of adult participation in non-formal (39%) and informal learning (43%) are already higher than formal education (24%)[38]. In the last decade there has been a shift in learning in the 55+ population from further education learning to learning at home and at work[39].

Summary: technology change makes it difficult to predict future digital skills. Technology and social change may result in more inclusive and available ways of acquiring skills.

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[30] LinkedIn (2014) Top 10 Job Titles That Didn't Exist 5 Years Ago https://business.linkedin.com/talent-solutions/blog/2014/01/top-10-job-titles-that-didnt-exist-5-years-ago-infographic

[31] Virgin Media Business and Oxford Economics (2015) http://www.virginmediabusiness.co.uk/news-and-events/news/news-archives/2015/Virgin-Media-Business-reveals-the-UKs-92-billion-Digital-Opportunity/

[32] UKCES (2015) Sector insights: skills and performance challenges in the digital and creative sector https://www.gov.uk/government/publications/sector-insights-skills-and-performance-challenges-in-the-digital-and-creative-sector

[33] Foresight *Future of an Ageing Population* (2016) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/535187/gs-16-10-future-of-an-ageing-population.pdf

[34] Green, Francis, et al. (2015) "The declining volume of workers' training in Britain." British Journal of Industrial Relations. 52(2) pp.422-488]

[35] Unwin L and Felsted A (2016) Learning in the Workplace: Research Evidence Summary

[36] House of Lords Select Committee on Digital Skills (2015) Make or Break: The UK's Digital Future. https://www.publications.parliament.uk/pa/ld201415/ldselect/lddigital/111/111.pdf

[37] UKCES (2016) UK Commission's Employer Skills Survey 2015: UK Results https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525444/UKCESS_2015_Report_for_web__May_.pdf

[38] BIS (2012) National Adult Learner Survey (2010) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34798/12-p164-national-adult-learner-survey-2010.pdf

[39] McNair S (2012) Older people's learning in 2012 http://shop.niace.org.uk/media/catalog/product/o/l/olderpeopleslearningin2012_full_web.pdf

4. Roles key actors can play

It is likely that interventions will be required across the digital skills landscape, with actors needing to work in coordination. Schools, colleges and universities supply employers with workers who possess differing levels of digital skills. Those already in the workforce possess varying levels of digital skills. However, the overall level of digital skills across the UK is not just determined by institutions which supply the labour force with skills. Businesses and employers set expectations for digital skills through recruitment. They upskill (or do not upskill) employees, and ultimately make better use of their employees' digital skills through efficient and effective work practices. Improving UK digital skills requires collaboration between the organisations that demand and use digital skills, as well as those who supply them. Policy interventions are available in regards to:

- The supply of digital skills in the workforce, which in turn can include the 'flow' of skills from education providers, or the 'stock' of skills of those already in the workforce;
- The demand for digital skills in the workforce, which includes how companies use, incentivise and develop digital skills of their employers.

This section describes the roles that key participants can play. The ideas were generated at the *Lifetime Learning in the Digital Age Summit* using the Cabinet Office's 'open policy making' approach.

The **flow of skills into the workforce** relies on the three main suppliers of workforce entrants: schools, Further Education (FE) and Higher Education (HE) providers. The computing curriculum has been designed to ensure that pupils acquire the knowledge and skills they need to progress to further study and pursue careers in technology-related fields. All maintained schools teach the computing curriculum, and it acts as a benchmark for Academies and Free Schools[40]. The recent Post-16 skills plan aims to address the digital rigour of FE courses by including digital skills, as specified by employers as necessary for occupational competence, in post-16 pathways[41]. Summit attendees suggested the following could be complementary to this:

- Provision of digital skills relies on teachers being confident in their own digital skills and use of technologies. Teachers should be offered training to address skills gap they may experience. This can build on the £4.5 million invested by DfE in programmes which support teachers' implementation of the new computing curriculum.
- Industry-provider partnerships, where firms articulate their digital skill needs and providers respond to them[42].
- Targeting underrepresented groups for computing degrees, including women, ethnic minority groups, disabled people and individuals from neighbourhoods with low participation rates, by ensuring that the education system provides opportunities to improve the diversity in uptake of subjects such as maths.
- Improving the digital competence of HE students in all subjects, for example including digital content within degrees. Provision is currently uneven across HE institutions[43].

[40] DfE (2013) Statutory guidance: National curriculum in England: computing programmes of study https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study
[41] BIS (2016) Post-16 Skills Plan https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/536043/Post-16_Skills_Plan.pdf
[42] Laurillard D (2016 – forthcoming) Digital Skills - Building and sustaining digital skills in the FE sector
[43] Universities UK (2015) Making the most of data. http://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2015/making-the-most-of-data-training-skills-english-universities.pdf

- Building work-readiness into Computer Science or STEM degrees. The Shadbolt Review argues for an increase in sandwich courses and work experience options[44].

For those already **in the workforce**, Summit attendees suggested the importance of a cultural shift towards lifetime learning and recognition of the need to reskill throughout life. Attendees suggested that the following could help achieve this:

- Encouraging and supporting employers to provide better workplace learning.
- Codification / accreditation, e.g. digital badging, so that individuals, employers and education providers can transfer learning from outside of the formal system and between workplaces.
- Developing self-identification skills so that individuals are better able to diagnose which skills they need, lack and can acquire.
- Supporting self-learning of technology through community groups.
- Significant life stage transitions (including childbirth, changing job, redundancy, children leaving home, bereavement, retirement) influence participation, and can provide the motivation to learn[45]. It could be productive to support learning particularly at these life stages.
- Supporting intergenerational and family learning – there is evidence that older adults are often motivated to learn to support their children[46].
- Improving the supply of part time digital courses at higher levels (Further or Higher Education) where the recent trend is a reduction in the number of part-time courses[47].

According to the Shadbolt Review *"Developing a clearer view of the skills that employers actually want is crucial, and there is a current lack of a coherent employer voice on what makes an employable Computer Sciences graduate".*[48] Employers determine how digital skills are used in the UK. A successful approach to improving digital skills can focus on the **demand for digital skills from employers**, not just the supply from education institutions. Attendees suggested four approaches:

1. Improving information on which digital skills and capabilities are available for employers, including how they could help their organisations become more productive and grow.
2. The importance of technology 'translators' in organisations, those who are able to bridge the gap between understanding new technologies and the possible impact they may have on value generation. These were referred to by some Summit attendees as 'digital strategists'.
3. Intermediaries, such as the CBI, the Institute of Directors, ACAS, and sector bodies, can share understanding of digital skills requirements between employers, providers and employees.
4. At the regional level local government and Local Enterprise Partnerships can develop a more detailed understanding of the digital skill requirements. There could be opportunities to join universities, colleges and other education providers with local employers, and design training courses specifically for the local economy.

The digital sector comprises 7.1% (£118.4bn) of the UK's Gross Value Added (GVA), 14.5% of UK exports and 4.4% (1.4m) of jobs[49]. The economic impact of digital is spread across the UK, with

[44] Shadbolt N (2016) The Shadbolt Review of Computer Sciences Degree Accreditation and Graduate Employability https://www.gov.uk/government/publications/computer-science-degree-accreditation-and-graduate-employability-shadbolt-review
[45] Warhurst (2016) Learning across the lifetime - What are the critical factors, attitudes, and motivations that affect an individual's propensity to learn across their life?
[46] Field (2016 – forthcoming) Informal learning in the family and community
[47] HEFCE (2014) Pressure from all sides: economic and policy influences on part-time higher education http://www.hefce.ac.uk/pubs/year/2014/201408d/
[48] Shadbolt N (2016) The Shadbolt Review of Computer Sciences Degree Accreditation and Graduate Employability https://www.gov.uk/government/publications/computer-science-degree-accreditation-and-graduate-employability-shadbolt-review
[49] ONS (2016) DCMS Sectors Economic Estimates: https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2016

some of the fastest growth taking place outside of the South East[50]. Given the importance of this sector to the UK, **specific policy may be required to support skills for the digital and creative industries,** (alongside digital skills needed for other sectors of the economy). Attendees suggested:

1. Further development of specialist technology institutions and applied research, learning from institutions like MIT, Pohang (in South Korea) and ETH Zurich.
2. Attracting very high skilled international talent on a sector-specific basis.
3. Improving the links between digital SMEs and education providers, for example assisting graduate integration into local SMEs through placements and training programmes.
4. Developing creative digital skills (not just digital skills): research suggests that digital employers increasingly want individuals with a mix of technology and creative skills[51].

Summary: It is likely that interventions will be required across the digital skills landscape. Improving UK digital skills requires collaboration between the organisations that demand and use digital skills, as well as those who supply them.

[50] Oxford Economics / Virgin Business (2015) The UK's £92bn Digital Opportunity http://www.virginmediabusiness.co.uk/PageFiles/10100/VMB-DigitalOpportunity-Report.pdf
[51] UKCES (2015) Sector insights: skills and performance challenges in the digital and creative sector, Evidence Report 92 https://www.gov.uk/government/publications/sector-insights-skills-and-performance-challenges-in-the-digital-and-creative-sector

5. Limitations and gaps in the evidence base that require further research

There is uncertainty regarding the nature of future technologies and the digital skills to use them. The following suggestions for further research and evidence-gathering were made in light of this:

- There is a need to better understand employer demand for digital skills. This could include better labour market information to link up employer demand and supply of digital skills.
- How can the education sector develop adaptable, curious workers, able to respond to the new technologies that come through?
- How important is education technology ('ed-tech') in schools, FE or HE institutions in improving the digital skills of students?
- How to improve participation of under-represented groups at FE and HE levels or in informal and non-formal education?
- What are effective ways to codify and accredit informal and non-formal learning, without jeopardising the potential of such learning for individuals who have had bad experiences of the formal education system?

Summary: there may always be uncertainty as to future technologies and future digital skill requirements in the UK. Attendees at the *Lifetime Learning in the Digital Age Summit* collaborated to create a number of ideas and research proposals in light of this uncertainty. Continued collaboration will be essential to achieving progress.

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Government Office for Science
1 Victoria Street
London SW1H 0ET
Tel: 020 7215 5000
Email: contact@go-science.gsi.gov.uk