Rebooting Tech Skills:

A blueprint to transform the digital skills landscape

Executive Summary

The UK labour market is facing structural changes, which will be felt by businesses for years to come. Some of these changes are global in nature, others are uniquely British. From the effects of the pandemic, to Brexit, to the potential disruption to the labour market caused by the transition to net zero and the impact of new forms of technologies, such as Artificial Intelligence (AI), these structural changes across the labour force cannot be easily stopped or reversed. The question for every country, including the UK, is how to seize the opportunities now and in the future. Achieving this will depend to a large extent on the ability of each country to tap into the ingenuity of its workforce and create the optimal conditions to encourage lifelong learning in digital skills. We call this the skills for growth equation.

The more that countries are able to promote personal development focussed on digital skills, throughout life, and the more adept the skills system is in responding to changes, the greater the potential for growth.

Microsoft are proud to author this paper, together with LinkedIn to show granular results on trends in the labour market on a nationwide basis. This paper looks at the digital skills landscape in the UK, to ensure that future talent reflects the needs of the future economy. For more information on our specific programmes, including previous research, our TechHer platform, digital bootcamps or Apprenticeships Connector, visit our Digital Skills Hub.

Microsoft has identified five specific recommendations to reboot the digital skills system for lifelong learning for all, with the ultimate aim of boosting economic growth across the whole UK. We are calling for partnership between government, academia and the private and third sectors to:

1. Provide more flexibility in the apprenticeships system for employers, including a modular approach, and a dramatically faster way for providers to add courses in response to need;

2. Embed computing and digital literacy skills across Key Stages 1 – 3 to boost uptake of Key Stage 4 Computer Science GCSE, including increasing provision for upskilling teachers;

3. Include the provision of technical and digital skills in schools' core success metrics;

4. Simplify the Government's approach to upskilling initiatives to streamline efforts and avoid unintended overlap. This will make the UK's digital skills programme more agile to lifelong learning needs and more cost efficient in nature;

5. Embed industry-standard curriculum and certification within academic programmes.

In the short term, some of the structural shifts in the UK labour market present a pressing challenge to the conditions that drive growth in the economy: productivity, the supply of available labour in the workforce, and the total size of the workforce in the economy. In short, these factors are restricting the stock of labour. In order to change gear, and increase the potential for growth, we believe there is a pressing case for the Government and industry to work together to address the skills for growth equation.

In this paper we focus on a critical element of this equation: digital skills. Technology is at the heart of the future growth equation. It can dramatically increase productivity, and having more people with the skills to use technology will increase the supply of labour for the roles that will be required in the economy of the near and far future.

Previous evidence from the Centre for Economics and Business Research has estimated that skills shortages, specifically in digital skills, are costing the UK economy £63 billion a year in lost growth potential.[i] Research published by the UK Government shows that roles which rely on digital skills offer those workers on average higher pay than roles that do not require digital skills.[ii] On this basis alone, a digital skills gap is a failure for both businesses and workers.

Digital and technical skills are not only necessary for jobs in the IT sector – they have a role across almost every area of the economy. Research from the UK Government highlights the spread, with 82% of occupations advertised online requiring digital skills as entry requirements.[iii]

Using LinkedIn data, we found that professions historically not considered to be digital, increasingly require digital skills. For instance, 78% of sales jobs and 66% of arts and design jobs in our data set require at least one digital or technical skill. Separately, professional areas such as research, marketing and engineering have experienced some of the highest levels of hiring growth between 2017 – 2021, with some of the fastest growing roles in these areas dependent on digital and technical skillsets. This demonstrates that digital and technical skills are becoming a universal requirement in the modern labour market.

Failure to meet demand, and respond to the increasing pace of technological change in the labour market could lead to lower growth and higher costs for individual businesses and the country as a whole. To mitigate this risk and realise the UK's potential, we are calling on the Government to adopt a twin track approach to tackling this challenge: reforming the school curriculum to increase the flow of talent with digitally adept workers, while also reforming apprenticeships and vocational training to simplify the system to respond faster to technological change.

It currently takes up to 18 months to approve a new apprenticeship standard. In a world where, in the space of four months, breakthroughs in AI can go from demonstrator to product launch, the standard could quickly become obsolete. Therefore, a more modular approach to training – with core and optional elements – would be better placed to respond to both the pace of change and business needs.

To increase the flow of talented workers who enter the labour market, and to reduce the need for additional training, we are also calling on the government to embed digital skills from Key Stage 1. As part of a broader, more adaptable, approach to lifelong learning, this would help schools expose pupils to technology in the formative stages of education.

We would also recommend that the Government lead an education sector and industry-wide simplification of pathways and provision, to reduce confusion and potential areas of duplication. One way to do this would be to introduce three categories – new to work, new to role, and upskilling in role.

At Microsoft, we are focused on empowering every person and organisation on the planet to achieve more through technology –to tackle the challenges facing us such as ensuring the efficient delivery of vital public services, improving health and care, or achieving net zero.

A skilled workforce underpins all of these goals. To power our economy, now and in the future, we want to work with government, businesses and civil society to make a big bet on digital skills. This is about becoming a world-class generator of digital skills and spreading opportunity across the entire country. The recent developments in emerging technologies, such as AI, mean digital upskilling must be accelerated across the country so we can realise inclusive growth for the benefit of our regional economies.

Without a digitally skilled UK workforce that is consistently and continuously trained to meet the everchanging challenges and demands of our modern workplaces, the UK will struggle to accelerate growth. A workforce with the digital capabilities to drive adoption of new technologies offers a more sustainable and inclusive pathway to growth. As this paper will outline, Microsoft believes that a lifelong and continuous approach to digital skills provision is fundamental to achieving this.

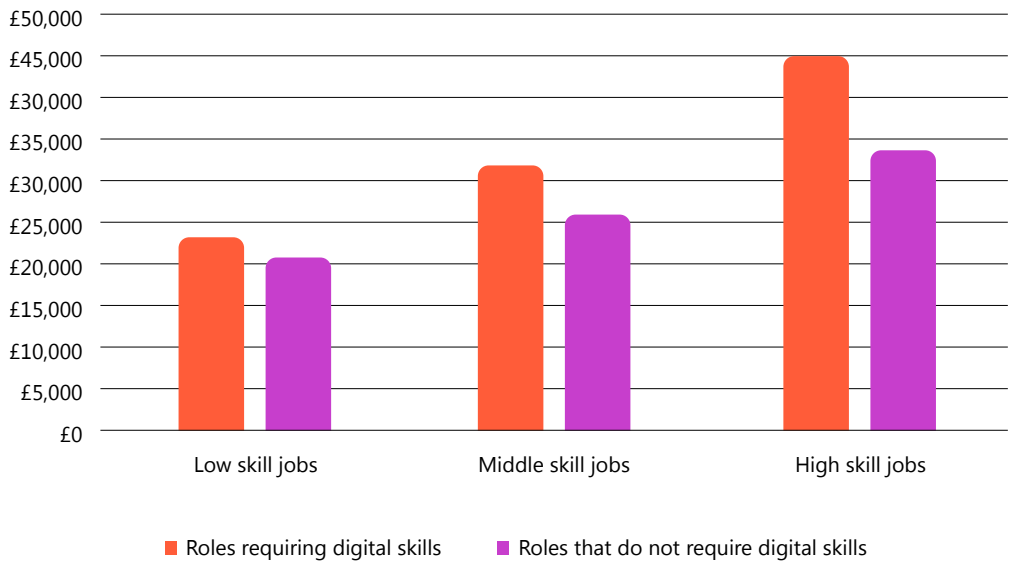
Chapter 1:
The Imperative To Act

In the face of challenging global conditions, and strong economic headwinds, policymakers are focused on how to grow Britain's economy. A number of the underlying conditions that drive growth – such as productivity, the number of hours worked, and the overall number of people in work – are currently causes for concern.

To boost the drivers of growth, in a way that doesn't contribute to further inflation, one or more of the drivers of economic growth need to be activated. In order to grow the economy, the Government needs to increase the number of people in work, as well as their productivity. With technology playing an increasingly vital role in the jobs of the future, helping workers improve their ability to use technology is crucial for boosting productivity.

Evidence shows that digital skills deliver dividends for workers, companies and the economy. For companies, digital skills now hold the key to a minimum of 2.4% of a company's turnover. To put that into context, for a small tech start up with a turnover of £1 million, this is £24,000 – just below the average wage in the UK.[iv] Roles that rely on digital skills (mainly or in part) pay up to 29% more than roles that do not.

Chart 1: Wage differential by skill level



For the UK economy, the demand is clear. More than four fifths (82%) of all jobs in the UK already require digital skills - a trend which is likely to grow further. However, this is not solely an issue that relates to advanced digital skills training. The mismatch between skills needed by companies and those present in the labour market is likely to worsen. By 2030, 1.5 million workers are likely to be acutely under-skilled in at least one STEM-related workplace skill.[v]

A lack of digital skills is not a problem we will face at the end of the decade. It is a problem that firms face now, and is slowing businesses' growth. Survey data from the Federation of Small Businesses found that, in England, more than one in four (26%) business owners lack confidence in their digital skills, while a fifth thought that a lack of digital skills among their staff was holding back their business and limiting their productivity. TechUK's Digital Economy Monitor survey published in 2022 found that business anticipated that skills shortages would be the most significant challenge faced over the next year.

The Department for Education's (DfE) Skills survey found that where businesses are facing skills shortages, this leads to a greater workload on other staff (84%), as well as difficulties in meeting customer service objectives (49%), resulting in higher operating costs (45%) and lost business (40%).

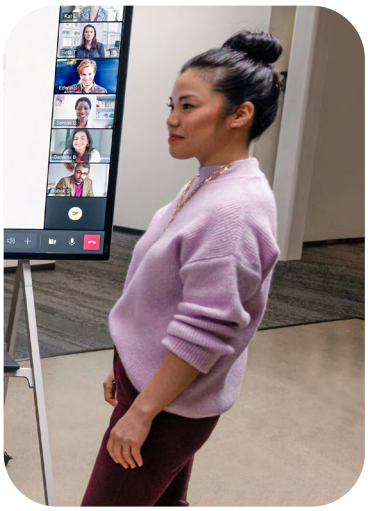
In addition to tackling these skills gaps, the UK labour market faces disruption. As the UK seeks to realise the opportunity from new technologies like AI, the education and training system will have to change accordingly. Given the scale of the challenge, and the pace at which technological change is happening, practical options to increase skills levels continuously throughout all stages of life will be required. A more flexible and agile digital skills pipeline would lead to a shift that supports the needs of the labour market. This would involve providing targeted training throughout a person's working life, as well as supporting foundational levels of education to build on.

Digital Skills in the UK

Using LinkedIn's anonymised and aggregated dataset[1], we can illustrate the growth in demand for digital skills among firms based in the UK. The data shows that there has been an increase in the growth of jobs that depend heavily on digital skills.[2]

By analysing LinkedIn data gathered between 2017 and 2021, we found that three job functions that heavily depend on digital skills – research, engineering and marketing - are increasing, with these sectors representing 7%, 6% and 3% of hiring growth in the data over the period. Healthcare, legal services and customer support, which are likely to be significantly disrupted by technology in the coming years, have seen an even larger share of job growth over the period. Research by Goldman Sachs highlighted that advances in AI are expected to have far-reaching implications for healthcare and financial services, while Credit Suisse found developments in AI offered a potential to "offload a greater fraction of customer service tasks to AI, freeing up human agents for more complex issues".

The opportunity presented from human ingenuity being empowered by technology and particularly AI is a clear conclusion from Microsoft's latest Word Trend Index (WTI).[3] The survey found that workers increasingly feel that their time is taken up by tasks which could benefit from AI – such as high volumes of communications and data – allowing people to reclaim time and energy for important work that fuels innovation. This is likely why the research found that, employees are eager for AI to lift the weight of work and free up their time. The WTI found significant optimism for the potential of AI, with 71% of UK respondents said they would be comfortable using AI for administrative tasks, 72% of UK respondents would be comfortable using AI for analytical work, and overall 86% of people would be comfortable with AI helping to find the right information and answers they need. We are only seeing the beginning of what this enthusiasm will mean in practice when applied to people's productivity.



From a regional perspective, we can demonstrate that job functions which increasingly rely on computing and digital skills like engineering and research are some of the most in-demand jobs across the UK. Table 1 below shows how many distinct areas these job functions appeared in. The data shows that digitally dependent jobs in four sectors – Research, Engineering, Marketing and IT – appear in top ten growing functions in almost half of the local areas across the UK.

Table 1: Job function appearance in top ten growth areas (2017 – 2021) by local area

Job Function	Area Coverage %
Operations	96%
Human Resources	80%
Marketing	69%
Research	48%
Engineering	48%
Information Technology	46%
Media and Communication	44%
Sales	41%
Business Development	35%
Legal	33%
Healthcare Services	28%
Accounting	24%
Customer Success and Support	22%
Finance	17%
Arts and Design	13%
Administrative	13%
Education	7%
Program and Project Management	6%

The heatmap (Table 2) in the annex section shows a significant number of local areas where these types of job functions show an increase in the percentage of hiring between 2017 and 2021. It also shows that while research, engineering, and marketing are ranked as some of the highest growing jobs in parts of the country, they are also growing across the country – with research growing in 83% of local areas, engineering in 70% and marketing in 89%.

[1] The underlying LinkedIn data used in this paper, collected between 2017 and 2021, explores the regional shift in employer demand, the in-demand jobs driving this shift, and the skills needed to perform those jobs.

[2] Based bespoke analysis of LinkedIn data, using a custom definition of digital skills and classifications by Microsoft to produce this paper.

[3] The 2023 Index surveyed 31,000 people in 31 countries, in February and March 2023, and analysed recent trends from LinkedIn Economic Graph alongside productivity data from Microsoft 365.

This illustrates that even in the midst of the coronavirus pandemic, when economies were shuttered, heavily digitally dependent jobs remained in-demand.

In our dataset, a job function can grow at different rates in different regions. We therefore used the number of local areas in which a job is on the rise and the average rate of growth across all of the regions in the UK to calculate an aggregate growth score. Using this method and applying it to the data, we found that jobs that are primarily digital-first jobs (such as data, software, digital marketing and analytics) are featured in the top five growing jobs in the digitally-dependent job functions – as seen below in Table 3.

Table 3: Growth score by job function, top five

Job Function	Job Name	Growth Score Rank (within function)
Engineering	Data Scientist	1
Engineering	Full Stack Engineer	2
Engineering	Software Engineer	3
Engineering	Engineering Manager	4
Engineering	Mechanical Engineer	5
IT	Data Analyst	1
IT	Data Engineer	2
IT	Information Technology Technician	3
IT	Technical Support Technician	4
IT	Technical Support Engineer	5
Marketing	Brand Associate	1
Marketing	Social Media Manager	2
Marketing	Marketing Assistant	3
Marketing	Social Media Coordinator	4
Marketing	Digital Marketing Consultant	5
Research	Laboratory Assistant	1
Research	Ecologist	2
Research	Business Analyst	3
Research	Business Intelligence Analyst	4
Research	Laboratory Scientist	5

As shown in Tables 4 and 5 in the annex section. the data also highlights that, as well as digital-dependent jobs growth, general digital skills and broader digital literacy are important for all non-digital job functions – with analytics, digital marketing and software also required in some roles. The need for digital skills in the labour market is becoming more prevalent. This stresses the need for a lifelong approach to digital skills provision that starts in primary school and continues after entering the workplace, including as part of career development in roles that are outside the technology sector.

Of the total 571 job titles that made up our analysis sample, 408 job titles included at least one digital skill. In almost half of the sectors in our data, over 90% of the jobs were based on digital skills. This suggests that as well as digital skills becoming more universally required in the labour market, jobs in some sectors are becoming increasing digitally dependent.

Table 6: Digital skills in all jobs

Job Function Name	Rate of Jobs with Digital Skills
Accounting	62%
Administrative	100%
Arts and Design	66%
Business Development	93%
Customer Success and Support	95%
Education	61%
Engineering	96%
Finance	54%
Healthcare Services	29%
Human Resources	44%
Information Technology	98%
Legal	44%
Marketing	97%
Media and Communication	76%
Operations	60%
Program and Project Management	100%
Research	92%
Sales	78%
OVERALL	71%

Microsoft is playing its own part in closing the digital skills gap. Get On is our campaign to enable 1.5 million people in the UK to build careers in technology and help 300,000 connect to tech job opportunities. We do this by advancing tech skills and connecting talent to real tech job opportunities with our partners and customers. To date we have helped over a million people gain the skills required to thrive in tech roles.

The evidence is clear and LinkedIn's data shows the demand. Jobs with digital skills can deliver better pay for workers and higher productivity for companies, as well as boosting UK growth. The increased digitisation of the economy, as well as the advent of new technologies like AI, will expand the application of technology from individual programmes to a near universal backbone that can support businesses' potential growth. The digital skills gap is a challenge that will reduce companies' potential and increase pressure elsewhere in the training system.

Having established why digital skills are increasingly essential for economic growth, business growth and personal development, we need to consider the best way to boost skills delivery. To ensure we have the skills the country needs to deliver, we recommend placing technical, in-demand skills at the heart of the education curriculum.

Chapter 2:
Transforming The School Curriculum

The rapid pace of technological change over recent years, and the need to ensure there are enough people with digital skills to meet demand, requires a reassessment of how we approach education.

Today's students will need to draw on computing skills throughout their lives, making it essential for them to study Computer Science. Our decades-long experience as a leader in computing, combined with global partnerships, gives us the capacity and experience to offer insight on a modern tech-savvy curriculum. Our Microsoft Computer Science Curriculum Guide is built on the belief that technology is key to creating the jobs of the future – with millions more digital jobs to be created worldwide in the years to come –, and that fostering understanding of computer science will help prepare students for the jobs of tomorrow. Our Computer Science Curriculum Toolkit is a way of looking at curriculum requirements from 5 – 18, and advocates including AI and Robotics and Big Data in primary school.

Digital capabilities can be divided into consumptive skills (the ability to use solutions built by others) and productive skills (the ability to create new tools and systems for others to adopt). While a lack of both consumptive and productive digital skills is persistent across the country, the lack of productive skills is far more pronounced. Since productive skills have nearly double the impact on business performance compared to consumptive skills, tackling the lack of these skills is urgent.[vi]

Based on our work with universities and employers, including our partner network of 30,000 companies, as well as research highlighted earlier, there is a pressing risk that the outcomes of the education system do not match the requirements of the current job market[vii]. Microsoft welcomes the Government's commitment to solving the computing and technical skills gap, so that the UK has the tech expertise and innovation to remain competitive in global terms. However, given the rapid technological progress that has transformed our economy, and consequently our labour market over recent years, we believe that the following further steps should also be taken.

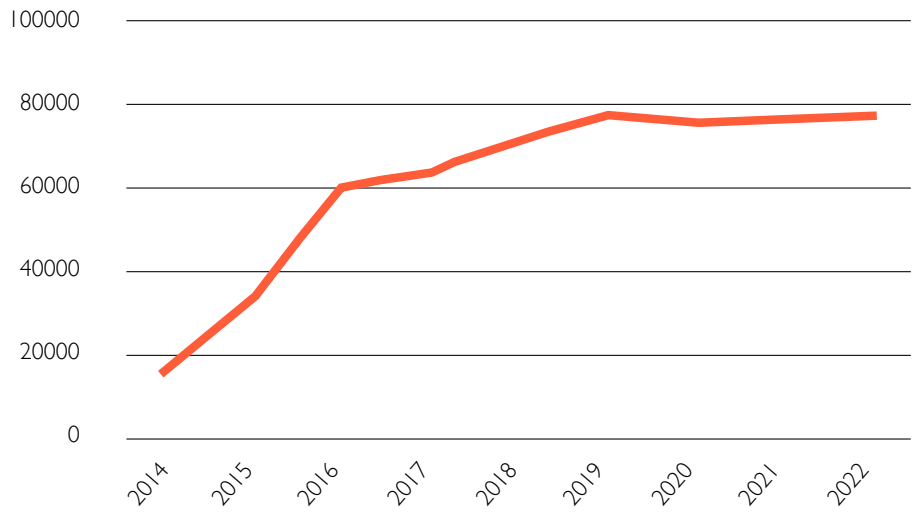
There should be a revamp of how we consider digital and ICT skills from the very first stages of education. This will help support people to acquire the digital skills needed to power the cutting-edge jobs of tomorrow and create a fair, inclusive and sustainable economy. Now is the time to simplify England's skills offer to pupils and develop the workforce of the future. Central to this is creating a curriculum that can be suitably open and responsive to new technologies while being agile to the jobs of the future, and that promotes ongoing learning over the long-term.

The challenge is two-fold – firstly, improve the flow of new technical talent into the world of work from earlier phases of the education system. Secondly, the stock of workers with high-demand digital skills should be increased across the economy.

Boosting the flow of talent from the education system

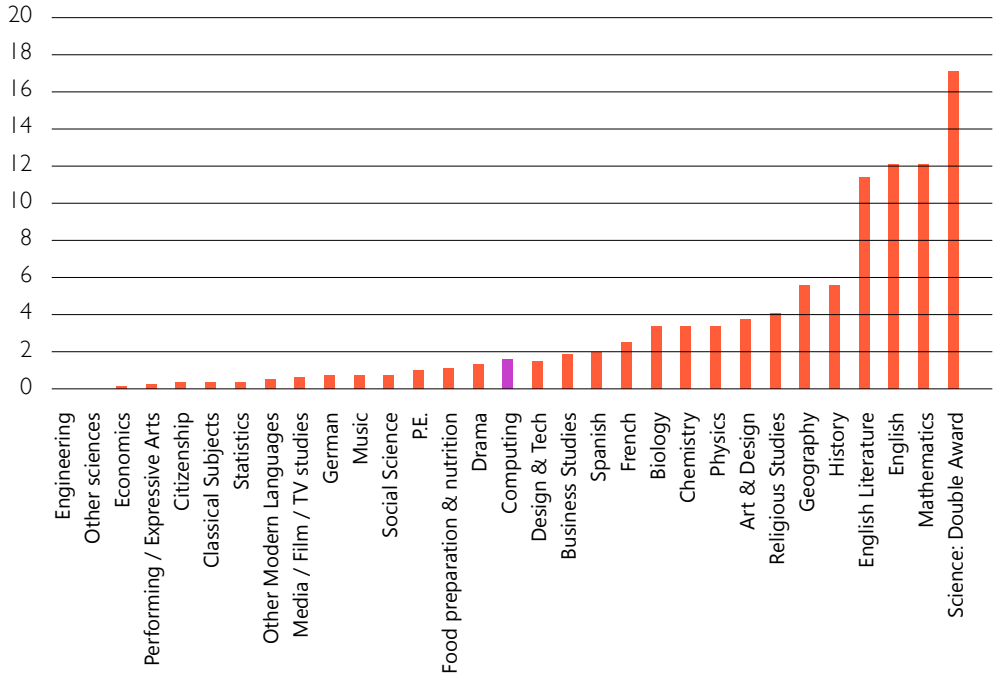
Since the introduction of the Computing Science GCSE at Key Stage 4, there has been a significant and welcome uptick in students taking this dedicated coding and syntax-focused GCSE option.

Chart 2: Number of students taking computing GCSE since 2014[viii]



However, this does not show the full picture. Although the increase is impressive, the total number of students taking the computing GCSE represents less than 2% of the total number of GCSE entrants in England in 2022.[ix]

Chart 3: GCSEs as a share of all GCSEs taken in England[x], 2022[xi]



There is also a concerning trend pointing to a growing gender divide among those studying for the Computing GCSE. The number of female candidate numbers dropped from 16,919 in 2020 to 16,549 this year – in spite of the overall number of students sitting the exam increasing year-on-year. Despite the decrease, girls still outperformed boys when it came to computing grades, with 48.9% of girls achieving at least a 7/A grade, as opposed to 37.3% of boys, and 87% achieving at least a 4/C or higher compared with 81.3% of boys.

At Microsoft, we believe in broadening opportunity so that a diverse pool of talented individuals can respond to the needs of the labour market and reach their potential. Three years ago, we joined with Catch22 to launch Digital Edge. Since then, the programme has supported more than 100 people from underserved and underrepresented communities to secure digital jobs. Using our Apprenticeship Connector programme, we are boosting social mobility. Almost half of applicants to the Connectors programme are from some of the most underserved parts of the country.

This low uptake of the Computing GCSE has contributed to a general ICT skills and awareness gap across Key Stage 3 – 4. Computing at School data shows that since introducing the new national curriculum for computing in England, the number of pupils taking digitally-relevant qualifications has dropped from 150,000 in 2010, to less than 80,000 in the last set of GCSEs.[xii] In order to drive the uptake of the Computing GCSE and to give students the key skills needed in a digital workforce, we advocate embedding computing and digital skills throughout the syllabus.

Options for reform:

1. Embedding computing and digital skills across Key Stages 1 – 3 to boost uptake of the Key Stage 4 Computer Science GCSE

We recognise the need to avoid extending or expanding the existing curriculum due to both a focus on standards across the curriculum, and budget constraints. However, there are straightforward opportunities to revamp the existing curriculum in positive ways across Key Stage 1 – 4 with the express aim of creating a clear, simplified education pathway to help young people prepare to enter the most high-performance professions. The last change to the English national curriculum was in 2014. There have been significant changes in the labour market since then, and the pace of technological change has become rapid. As a result, there is a compelling case to reform the curriculum to equip students with the tools needed in future. Microsoft recommends a radical but efficient approach that could act as a powerful multiplier for the use of computer science across the education system:

- Microsoft recommends that the National Curriculum for Design & Technology (Key Stages 1 – 2) should be adapted to include a more deliberate and practical application of ICT, computer science and digital literacy skills across all subjects to spark a fascination in and basic understanding of the subject from the earliest point in primary school.

- In line with this approach, at Key Stage 3, we recommend that the diverse, practical uses of technology and the ability to apply digital solutions effectively should be embedded throughout the entire education system, both in terms of subject matter application and for teaching and learning, to boost overall computing and ICT awareness across Years 7, 8 and 9. This will help to address the needs of students at Key Stage 3-4 who were not provided with ICT education through non-computer science courses following the cancellation of the ICT GCSE in 2014.

In addition to these two reforms, a key part of enabling a curriculum that provides for the future, is the delivery of it. Successfully delivering a modernised, ambitious and forward-looking curriculum that equips pupils with the digital capabilities they need will require additional funding for technical equipment – hardware, software and platform – as well as increasing the technical capabilities of teachers.

We believe that these changes will not only develop transferable, practical technical skills that will eventually be the foundation of in-work skills, but also, more immediately, create a stronger pipeline of enthusiastic pupils taking up the formal Computing Science GCSE at Key Stage 4.

It is crucial to recognise the need to support schools to transform pupils' exposure and passion for computer science in these formative secondary school years.

Microsoft runs the Explore the Digital Future initiative, a programme which provides resources for schools and staff to prepare young people for the tech-driven world.

Through these changes, Microsoft believes it remains vitally important to support the National Centre for Computing Education. The curriculum is the first of its kind globally, which includes continued investment in teacher training and the development of an established pedagogy for the subject. Improving the education experience at ages 11-16 is vitally important to addressing the lack of gender diversity across those taking GCSE Computer Science. We endorse calls, including from Pearson, for the Design and Technology Curriculum to include dedicated employability and sustainability skills to help young people sharpen their pathway into employment once exiting formal education.[xiii]

2. Reforming the Computer Science GCSE

While recognising the world-leading progress of creating a dedicated Computer Science GCSE, there are opportunities to examine how to evolve this GCSE from its current focus on pure software development and coding into a subject geared to the applied use of technology in specific sectors. A recent report by the Education Policy Institute[xiv] states that take-up of IT and computing courses at GCSE has fallen by almost half (43%) since its peak in 2016. This reinforces the need to reassess the format and content of the core Computer Science GCSE course.

As Professor Dame Calder and Professor Peyton Jones have set out, at present the GCSE does not provide a meaningful pathway for students with broader, increasingly applied, interests.

The rapid rise in the significance of computing in recent years means that there is an increasingly urgent need to implement a modern approach to the subject in the curriculum. Given the pace of technological change, there is a constantly growing understanding about the potential as well as drawbacks of technology. In order to help prepare for these aspects of life and work, students should as a minimum learn to navigate these issues. There is not only a requirement to navigate technology. Students should also become contributors to computing science and learn how to adapt to a constantly changing digital landscape. The Microsoft Computer Science Guide includes a curriculum structure, map and implementation guidance, as well as a programme of study objectives and proposed content for computing that spans learners from ages 5-18. This curriculum guide is based on our years of expertise as a leader in the computing industry, on academic research around the teaching of computing, and on learnings from countries around the world.[xv]

Computing has evolved at a breath-taking pace, and change will continue to accelerate into the foreseeable future. Almost daily or weekly developments in new technologies have the potential to render a curriculum out of date very quickly. A lot of curricula used in schools now pre-date the rapid rise in significance of key areas such as AI - which is rapidly changing the world. Computing, as part of the curriculum in England, needs to be as future-proof as practical and regularly updated. A child studying a curriculum over the course of 13 years will live through changes in technology that are hard to imagine. Therefore, the curriculum needs to be designed in a way in which learning activities can be constantly updated.

There is an opportunity to create a new 'applied computing' GCSE at Key Stage 4 level which enables students to use programming skills to build concrete applications in graphics, robotics, business data processing, data science, web design, and databases, to name a few. However, the transformation of the curriculum will take time. We recommend doing so in a staged process; firstly, reforming key stages 1-3 to boost uptake of the Computing GCSE, and then later, reforming the Computing GCSE.

To ensure those in the later stages of their education – such as people currently entering higher education routes – are also equipped with the skills they need to excel in the workplace, it is vital to also address how critical digital skills delivery can be embedded in the higher education system.

3. Embed industry-standard curricula and certifications within HE programmes

Alongside these vital reforms of the computing education landscape, it is also important to identify practical, more immediate reforms that can be implemented to tackle the live skills gap and create a pipeline of people ready to create a modern, employable workforce with core technical skills. In our previous research, Degree + Digital, we found that students increasingly need both a good academic qualification as well as evidence of digital capabilities to enter and progress within the labour market. To achieve this dual objective, academia and industry must work together in order to produce a digitally capable workforce.

Out of the total 394 institutions - 230 colleges and 164 degree awarding bodies - that Microsoft works with in England, 63% of these institutions have signed up to the University Cloud Challenge and with students who are studying and certifying with Microsoft.[xvi] Our previous research shows that certification increases employability. We found that students with a Microsoft Professional Certification on their LinkedIn profile are 2.4 times more likely to be hired.[xvii]

As part of this effort, the British Computer Society – the chartered institute for IT in the UK - have accredited eight of the Microsoft Fundamentals certifications. BCS accredit 85% of computing degrees in the UK. Accreditation of Microsoft Fundamentals can provide that third-party endorsement and validation which accelerates the adoption of Microsoft curricula and certification - within or alongside academic programmes.

Microsoft teamed up with two Scottish colleges to develop nationally-recognised qualifications which will equip students with the key tools needed for the workplaces of tomorrow. These two new qualifications - called "The Wonder of AI and Cloud" and "Digital Business Decision Making" – are aimed at 16-to-21-year-olds who might have overlooked traditional computer science courses. Certification content also includes AI and Microsoft Azure, as well as helping students hone specific tech proficiencies in Microsoft's Office products including Excel, Word and PowerPoint. Integrated with the Scottish education provision, these qualifications are accredited into the SCQF framework, and will help students into college or university or get a job.[xviii] In addition to a SCQF Level 6 qualification, students acquire 3 or 4 Microsoft professional certifications.

Other companies are offering certification programmes for technology skills, and there is an opportunity for an industry-wide partnership with the Government to support education providers by enriching curricula with practical, industry-backed curriculum and qualifications to increase employment outcomes for students and pupils.

Currently, in England, there are 80 institutions who are signed up to deliver the Microsoft Learn for Educators Programme. While most are teaching in a blended fashion, alongside relevant academic programmes, a growing number are integrating the materials, and sometimes the certifications, into their academic programmes. For example: Lincoln University now offers a postgraduate degree in Cloud Computing which allows students to access industry cloud certifications designed to ensure students are equipped with the skills required in a digitally-enabled economy. Nottingham Trent University's undergraduate course in Computer Science and AI includes, as part of the course syllabus, a Microsoft Azure AI Fundamentals professional certification. Nottingham University Business School offers industry recognised certification through the Microsoft Learn for Educators Programme, which offers students the ability to combine industry-aligned curriculum as well as certifications to build skills in high-demand technologies such as AI, machine learning, data and analytics. With 81% of UK business leaders saying employees will need new skills to be prepared for the growth of AI[5], one ability likely to be required in the future workplace, outlined in the latest Work Trend Index, is an AI aptitude. By helping students and employees work with AI, from practising prompt engineering to verifying AI generated content, the potential offered by AI would be higher.

Alongside the significant impact embedding vendor certifications has on increasing employment outcomes and filling the skills gap, collaboration between the private sector and universities also drives the exchange between academia and industry that is vital for fostering innovation and research and development capabilities across the country. The exchange between the private sector and academia is a mutually beneficial partnership, that promotes diversity in thinking, ensures knowledge exchange between parties, and maximises the economic value from research.

Not only is it vital to transform the entire computing education landscape from primary school to GCSE and Higher Education, we must also examine the way we fund certifications and technologies in schools, too. Through our work on apprenticeships, we know how important it is to partner employers with schools to demystify the tech and digital sectors, while raising the visibility of apprenticeships. Enhanced careers advice and guidance could further boost the entry rates in digital jobs. In line with the embedded approach we advocate, enhanced advice services for students should be developed with partners – such as local employers and trade groups – to ensure that young people are developing the skills that employers need.

[5] Fieldwork carried out in February and March 2023, published in the Work Trend Index.

4. Embracing the potential of technology to enhance education provision

By embedding technology across educational organisations from operations to the classroom, the potential to enhance educational provision is limitless.

> AI has the potential to transform every stage of higher education, from assignments, to exams, to classrooms. One real world case study, that used ChatGPT in a classroom setting over five days, demonstrated this - from answering simple questions, and being able to field follow up queries, to helping to understand and write code.

To enable academia and industry to embed technology effectively across educational environments, Microsoft recommends that the Government develops measures that support the development of education tech in these settings, and the upskilling of teachers to increase technology proficiency. Advances such as AI will offer new potential - in work and in learning. The level of success depends on equipping workers with skills for a AI powered future.

To embed technology effectively across educational environments, the DfE recently announced support to ensure schools have a secure and reliable foundation in place before they can consider using more advanced technology. The Department updated its digital and technology standards, covering cloud technology, servers and storage, and filtering and monitoring, which are aimed at helping schools save money and create secure learning environments. As part of this, the DfE launched a new digital service to help senior leaders with their technology planning.

The tool will assess the schools' available technology against digital standards, suggest areas of improvement and provide actionable steps and self-serve resources to implement these recommendations. According to the DfE, the tool will be piloted in two areas in England later in 2023, before being rolled out across the country. While this is a welcome announcement from the Department, there is a broader requirement to increase technological capability in classrooms – both in terms of teachers and hardware. The Royal Society, in 2019, found a shortage of appropriately qualified computing teachers in secondary schools. Between 2014/15 and 2018/19, there were over a thousand fewer entrants to computing teacher training than the Government required.[xix]

We also recommend that the Government considers investment in teacher training to ensure technology is effectively taught to students across different stages of the curriculum. Specifically, we recommend adapting teacher training programmes to include and require technology proficiency – both in teaching and learning, and applied technology in their subject of focus, in order to qualify as a teacher.

5. Include the provision of technical skills in schools' success metrics.

As well as reforming the content of computing and embracing the potential of education technology to increase capacity, we believe progress in computer science should be included in the outcomes for success. The education inspection framework by Ofsted sets out how schools and other educational institutions deliver skills and education.

Despite the previously described welcome changes to the curriculum in 2014, the words "digital" and "technology" remain notably absent from Ofsted's framework. Ofsted's inspection framework has significant impact on which skills and education outcomes schools prioritise. An inclusion of digital skills as an outcomes-focused performance indicator, contributing to the assessment of schools by Ofsted, would therefore be a powerful change to Ofsted's framework that would likely contribute to increased ambition across schools to provide pupils with the digital skills they need to succeed in their later careers.

Another way to improve computing outcomes for students would be through changes to Progress 8. Progress 8 applies to local authority-maintained schools, academies and free schools as well as Further Education colleges (with provision between 14 - 16 years old). Introduced in 2016, it aims to encourage schools to offer a broad and balanced curriculum at Key Stage 4, and reward schools for the teaching of all their pupils. The new measure will be based on students' progress measured across eight subjects: English; mathematics; three other subjects (either sciences, computer science, geography, history and languages); and three further subjects, which can be from the range of EBacc subjects, or can be any other approved, high-value arts, academic, or vocational qualification. Although Progress 8 encourages students to take eight qualifications, guidance published by the DfE states that this is not compulsory. If a student has fewer than eight qualifications or the qualifications they do sit are not on the list of subjects which count towards Progress 8, they will score 0 points for the unfilled slots.

In order to both measure success in the years ahead, and equip students with the skills required to gain jobs of the future, we recommend putting computing science on the same footing as English and mathematics. This would also incentivise schools to articulate and outline how they will ensure all students achieve computing and digital literacy skills and awareness across Key Stages 1 – 3 - a key step to boost uptake of Key Stage 4 Computer Science GCSE.

Against the backdrop of policymakers' welcome ambitions to transform digital skills provision, this move would provide a tangible step in incentivising education providers to ensure digital skills provision is taught in a measurable way.

Chapter 3:
Creating An Agile Vocational Education System

In addition to changes within the school system, we believe that there are also important reforms to be made to the vocational education system. The UK skills system needs to be more adept to respond to technological advances and the needs of the labour market. For example, LinkedIn data shows that skills held by workers in IT and media jobs in the UK have changed, on average, by 27% between 2015 and 2022. In some jobs, the change is more pronounced. The skills needed by a Data Analyst in the UK have changed by 42% over the same timeframe. Therefore, we need to ensure that the UK's training system can meet the increasing demand for digital jobs.

The latest statistics on apprenticeship starts by sector from the DfE in Table 7 shows that out of 13 subject areas, ICT-based apprenticeships were the 6th most popular in 2022/23. ICT apprenticeships also grew by the highest rate (7.2%). This shows both the opportunity to address the critical gap in the labour market, and also the challenge in meeting this rising demand.

Table 7: Apprenticeship start levels by sector, 2019-2023[xx]

	2019/20	2020/21	2021/22	2022/23
Agriculture, Horticulture and Animal Care	2.00%	2.00%	2.40%	2.50%
Arts, Media and Publishing	Low	Low	0.50%	0.50%
Business, Administration and Law	28.30%	29.00%	25.20%	25.20%
Construction, Planning and the Built Environ-ment	9.30%	9.00%	11.50%	11.40%
Education and Training	2.40%	3.00%	2.90%	2.80%
Engineering and Manufacturing Technologies	19.40%	13.00%	16.90%	17.60%
Health, Public Services and Care	19.60%	26.90%	23.30%	23.40%
History, Philosophy and Theology	no data	no data	low	low
Information and Communication Technology	5.30%	6.00%	5.80%	7.20%
Leisure, Travel and Tourism	1.70%	1.00%	1.30%	1.20%
Retail and Commercial Enterprise	11.50%	9.50%	9.90%	7.90%
Science and Mathematics	low	low	low	low
Social Sciences	low	low	low	low

Options for reform:

1. Reforming the system of Apprenticeships

The construction of apprenticeships standards and the Apprenticeship Levy have delivered important results for the technology sector for over a decade. At Microsoft, we have been proud of our work with Government and industry to support this. However, we believe that the system now needs to evolve.

Technology continues to develop at pace and as a result, so do the skills needed by employers. Currently, it can take up to 18 months until a digital apprenticeship standard is approved. By that time, the digital skills employers require their workforce to possess have moved on, as the recent rapid progress in AI technology illustrates. Apprenticeships standards for tech skills can therefore struggle to be future-proof, and risk being not fit for purpose. As employers build the workforce of the future, apprenticeship standards need to keep pace. We therefore recommend that the construction of standards should be reformed to become more agile to fit the needs of employers in the 21st century economy, where skills requirements are continuously evolving. We recommend creating a system that is first and foremost, employer-led – one that in a rapidly advancing tech environment continuously meets and delivers against the ever-changing digital skills needs of businesses.

In Microsoft's view, one way to make the skills system more responsive to the needs of the labour market is through a shorter, more modular approach to training. Currently, a level-three apprenticeship takes a full time student 18-months to complete. A return to a modular, core and options approach – which can be completed quicker – could address this need for agility. This would give employers the opportunity to create programmes to meet the existing needs of the business, while providing the flexibility to adapt these over time, depending on the changing requirements of the business and the skills that their employees need. This modular, core and options approach would provide greater flexibility for employers to tackle the specific skills shortages they are facing. This would enable employers to use a levy more broadly to grow the skills needed in today's economy, but also more quickly to adapt to the rapidly changing requirements of digital roles.

The current, level-based approach for Apprenticeships in Digital Skills does not meet the skills needs of employers due to the rapid evolution of digital and technical skills, and it has further increased the complexity of the apprenticeship system. This makes it harder for employers to navigate how they can tackle skills gaps in their businesses. To ensure the approach is truly employer-led, apprenticeship standards should be mapped against occupations that exist now and create space for future learning needed rather than be dictated by levels. Mapping apprenticeship standards against occupations without levels will also allow the system to evolve as the skills requirements of roles change. The standards would also be more reflective of how employers in the UK and worldwide identify the digital skills and competencies required across professions. An example worth considering in this context is the SFIA skills and competencies framework for the digital world[xxi], which provides an occupation-based mapping of the digital and technical competencies and skills required across professions and which is used by employers worldwide.

[6] https://sfia-online.org/en/about-sfia/about-sfia

As part of this reform, there is an opportunity for the Institute for Apprenticeships and Technical Education to build on its strengths across occupation-based standards and address the reality that every new job requires digital skills by creating a digital route map that reflects the occupations and needs of employers with digital skills requirements. This embedded digital training approach is a vital part of the UK's effort to ensure it becomes a science and technology superpower by 2030.

2. Allocation of Levy Funds

One impact of current levels of wage inflation could be an increase to the amount of apprenticeship levy which is unspent. This provides an opportunity to target specific activity to support those organisations who deliver apprenticeships, enabling them to create greater impact.

Apprenticeship funding band increases: As with other costs across the economy, the costs to deliver apprenticeship programmes have not been isolated from these rises. Costs have risen in line with inflation across the board, but funding bands to deliver high quality apprenticeship programs have not. Funding bands are usually reviewed as part of broader assessments of apprenticeship content, which can take time. The Government has announced an exceptional review of funding bands in 20 high-volume apprenticeships, selected by DfE. In light of the wider economic environment, we are calling on the Government to review all apprenticeship band funding.

Maths & English provision funding increase: In the same way focus is being driven to deliver key and critical maths provision such as the Multiply program, English and Maths provision funding in apprenticeships has not benefitted from attention. Maths and English skills are critical. The Government should fund these skills at the appropriate level to ensure high quality delivery from providers.

Increased funding for Additional Learning Needs and Special Educational Needs provision: The world for young people and the bridge between education and employment has seen a seismic shift but needs are different. Increasing the allocation of funding to Additional Learning Needs and Special Educational Needs provision to young people, specifically for 18 – 24 year olds, would enable apprenticeship providers to support this group and help encourage more people from different backgrounds to feel supported and successful as they enter the working world.

3. Simplifying the system

"Will every young person leave the education system with the skills they would get in Japan, Germany or Switzerland?"

This is the simple question Chancellor Jeremy Hunt set out in his Autumn Statement in November 2022 when he outlined the Government's ambitions on skills reform. The Government has shown welcome ambition and awareness of the need to ensure people are equipped with the skills they need to succeed in the labour market, now and in future, as Britain seeks to harness the economic opportunities digitisation and technologies such as AI, quantum and robotics have to offer.

The Chancellor is right to outline the challenge that we are facing in its most simple terms. There is a highly complex and overlapping system run by the Department for Culture, Media and Sport and the DfE that those seeking to upskill currently have to navigate. The multitude of schemes represent a commitment to solve the skills gap, but such energy has resulted in severe overlap.

At present, there is a myriad of Government-funded digital skills initiatives, creating a complicated system of upskilling initiatives with sometimes duplicated remits and contributing parties.

Two examples of potential crossover are skills bootcamps and Local Skills Improvement Plans (LSIPs). In England, the DfE currently lists 889 colleges and training providers that have received government funding to run digital skills bootcamps. In the digital sector alone, providers offer over 1,000 courses. Across England, LSIPs are being developed by designated employer representative bodies. Between skills bootcamps and LSIPs, there is not only an overwhelming quantity of government-funded upskilling initiatives available, but also a significant degree of overlap. For instance, higher education institutions are involved both with the delivery of skills bootcamps, as well as with LSIPs. Alongside creating a more streamlined skills delivery system easier to navigate for those looking to upskill, it would also enable the identification and reduction of inefficiencies in Government spending at a time where public budgets are under immense pressure.

A radical, yet simple overhaul of the skills delivery system could follow a three-bracket organisational and funding scheme:

New to work: Skills initiatives for those entering the workforce, aimed at equipping them with the relevant digital skills to take up entry-level roles.

New to role: Upskilling programmes targeting those new to a role to help workers meet the skills requirements in their new role.

Upskilling in role: Skills initiative aimed at helping people succeed and climb the career ladder.

This categorisation would ensure that, rather than focusing on certain age groups or demographics, that skills delivery focuses on addressing the skills development stage of workers. Similar to our proposal for a modular, core and options occupation-based approach to digital apprenticeships standards, this approach would be able to account for the rapidly evolving nature of digital skills requirements while at the same time simplifying the landscape of upskilling opportunities and programmes.

As part of the 'Trailblazer' group, Microsoft has previously worked closely with the IfATE on developing the occupational standards which form a key component of an apprenticeship and which also underpin T-levels. The objective of these 'Trailblazer' apprenticeships was to improve the quality these schemes, and to ensure that apprenticeships meet the requirements of employers, the sector and the economy. Drawing on our work as part of the 'trailblazer' group with the IfATE and transferring the learnings onto skills delivery more widely, we therefore know how important it is that the skills delivery system is geared towards the needs of employers, is easy to navigate and agile enough to keep pace with new and emerging technologies that transform our economy.

Emphasising the importance of upskilling as a catalyst for economic growth, the recent Budget noted that the "UK's second cities [...] are held back by poor connectivity and skills disparities" and outlined the importance of upskilling to increase UK productivity and GDP.

Against the backdrop of the current spending pressures which affect all areas of government spending, and the imperative to deliver a step-change that meets the challenge of transforming Britain's skills delivery, it is vital to create a simpler, more streamlined system for digital skills delivery and upskilling. The skills measures announced in the Budget are welcome from a Microsoft perspective, as they underscore the Government's commitment to transforming skills delivery across the UK. However, while these measures are helpful and ambition is welcome, more concerted action will need to be taken to address the systemic issues of supply of labour.

The benefits of simplifying the existing system from a spending perspective are obvious. A simplification would avoid overlap in remit between Government-funded initiatives, thus maximising efficiency and outcomes.

Reforming the skills delivery system also allows for greater alignment with the needs of the job market, providing an opportunity to create a more streamlined and agile system that can be adapted at pace as technologies and labour market demands progress. For businesses and employees, this will also facilitate the navigation of the Government initiatives available to them.

To open up opportunities for everyone – regardless of where they live or where they work – a simple, easily accessible system is absolutely vital.

Annex

Table 2: Heatmap of job function growth[4]

Total UK	0.41%	0.39%	0.21%	-0.07%
Local Area	Research	Engineering	Marketing	IT
Aberdeen And North East	13.29%	-15.25%	21.24%	1.12%
Bournemouth And Christchurch And Poole	11.52%	8.68%	14.31%	1.59%
Brighton and Hove And East Sussex	1.54%	5.34%	14.02%	2.78%
Bristol	-0.79%	8.28%	5.58%	1.78%
Buckinghamshire	10.93%	8.82%	-0.16%	-16.26%
Cambridgeshire And Peteborough	1.83%	-3.80%	6.33%	-3.00%
Cardiff	-7.16%	15.72%	8.91%	14.44%
Cheshire And Warrington	7.34%	-5.69%	11.45%	-7.64%
Cornwall With Plymouth	33.71%	15.77%	8.25%	9.48%
Derby And Derbyshire	-8.76%	-0.52%	21.62%	0.75%
Devon	21.59%	17.25%	19.12%	14.65%
Durham And Tyne and Wear	12.05%	5.77%	3.39%	-6.20%
Edinburgh And Lothians	5.73%	20.23%	15.11%	-0.14%
Essex And Southend on Sea And Thurrock	1.89%	7.92%	8.98%	-3.57%
Glasgow And Strathclyde	17.21%	10.22%	9.58%	1.03%
Gloucestershire	-5.84%	7.64%	14.28%	-3.35%
Greater Lincolnshire	35.75%	1.71%	3.63%	-1.09%
Greater Manchester	15.82%	6.28%	7.98%	2.43%
Hampshire	0.40%	-1.63%	17.11%	-5.65%
Hertfordshire	8.76%	3.19%	8.69%	-5.06%
Highland And Islands	13.35%	4.82%	6.34%	24.24%
Hull And East Yorkshire	17.28%	6.67%	-7.18%	5.31%
Kent And Medway	1.11%	1.16%	15.87%	-2.50%
Lancashire And Cumbria	15.42%	-0.38%	17.64%	-3.12%
Leicester And Leicestershire	13.98%	-2.67%	-1.75%	-0.79%
Liverpool City Region	14.89%	-0.47%	6.93%	-2.40%
London	5.04%	10.84%	5.52%	-1.69%
Luton And Bedfordshire	31.12%	13.96%	16.28%	-12.75%
Mid And North Wales	-9.84%	3.20%	16.62%	4.66%
Milton Keynes	18.43%	9.02%	-3.25%	-11.36%
Norfolk	23.44%	-1.67%	34.22%	-3.28%
Northamptonshire	5.55%	2.47%	12.54%	1.48%
Northern Ireland	11.61%	9.92%	-0.43%	10.22%
Northumberland And Tyne And Wear	26.00%	0.99%	6.21%	-8.85%
Nottingham And Nottinghamshire	6.43%	13.45%	6.45%	3.09%
Oxfordshire	10.59%	4.20%	1.61%	-5.59%
Scotland South	-18.18%	11.34%	-2.15%	-5.59%
Solent	-1.46%	6.63%	2.42%	5.37%
Somerset	8.30%	5.68%	15.25%	-5.68%
South Wales	19.53%	-4.74%	12.45%	3.16%
South Yorkshire	-3.76%	0.64%	15.08%	6.59%
Stoke on Trent And Staffordshire	19.44%	3.77%	9.15%	-4.06%
Suffolk	6.24%	11.145	7.11%	3.50%
Surrey	16.69%	2.45%	7.77%	-14.42%
Swindon And Wiltshire	-1.03%	12.24%	13.01%	-0.63%
Tayside And Central And Fife	19.30%	-5.45%	29.80%	15.19%
Tees Valley	28.26%	-10.20%	20.76%	4.39%
The Marches	9.28%	-8.49%	8.87%	-9.46%
Warwickshire	10.93%	-3.55%	16.23%	4.10%
West Midlands	10.76%	-1.92%	12.17%	-2.29%
West Sussex	2.60%	1.10%	8.65%	1.00%
West Yorkshire	3.72%	4.80%	11.84%	-5.14%
Worcestershire	12.80%	7.73%	10.96%	3.18%
York And North Yorkshire	1.53%	-3.80%	17.70%	-0.60%

[4] Job growth figures represent a five year growth in the percentage share of hires in the UK, rated by job function, between 2017 and 2021.

Table 4: Digital Skills by job function

Job Function Name	Analytics	CRM	Digital Marketing & Advertising	Game Development	General	Product / Project Management	Software / Cloud	UX & Design
Engineering	35			10	5	12	119	
Information Technology	42	12	2		11	8	90	5
Marketing	9	2	27		9	3	5	2
Research	37	1	1		5	5	7	1

Table 5: Digital skills in non-digitally dependent job functions

Job Function Name	Analytics	CRM	Digital Marketing & Advertising	Game Development	General	Product / Project Management	Software / Cloud	UX & Design
Accounting	1				5			
Administrative	2		1		6			
Arts and Design	1		4	3	5	3	9	8
Business Development	1	3	2		5	1	2	
Customer Success & Support	3	6	4		8		6	
Education	9		1		4		1	
Finance	12				6		2	
Healthcare Services	2		1		5			
Human Resources	2		6		5			
Legal	5				5			
Media and Communication	1	1	13		9	1	2	
Operations	6	3	2		6	2	2	
Program & Project Management	1		2		4	11	6	1
Sales	4	3	10		11	2	5	

[i] Good Things Foundation (2018): The economic impact of Digital Inclusion in the UK
[ii] DMCS (2019) No Longer Optional: Employer Demand for Digital Skills
[iii] DCMS (2019): No Longer Optimal: Employer Demand for Digital Skills; SFIA (2023): About SFIA
[iv] Microsoft (2020): Unlocking the UK's potential with digital skills
[v] Industrial Strategy Council (2019): UK Skills Mismatch in 2030
[vi] Microsoft (2020): Unlocking the UK's potential with digital skills
[vii] Microsoft (2020): DEGREE + DIGITAL: How today's academic institutions can equip students to thrive in tomorrow's workplace
[viii] Joint Council for Qualifications (2023): Examination results
[ix] Joint Council for Qualifications (2022): GCSE (Full course): Outcomes for main grade set for each jurisdiction: Results Summer 2022
[x] Science: Double Award counts as two GCSE entries.
[xi] Joint Council for Qualifications (2022): Outcomes for main grade set for each jurisdiction (Age 16)
[xii] CAS data
[xiii] Pearson employability and sustainability DT campaign
[xiv] Education Policy Institute (2022): Digital Skills Divided: Technical provision for 16 to 19 year olds
[xv] Microsoft (2023): Microsoft Computer Science Curriculum Whitepaper
[xvi] Cloud Ready Graduate (2023)
[xvii] Microsoft (2020): DEGREE + DIGITAL: How today's academic institutions can equip students to thrive in tomorrow's workplace
[xviii] Microsoft (2020): DEGREE + DIGITAL: How today's academic institutions can equip students to thrive in tomorrow's workplace
[xix] The Royal Society (2019): Policy briefing on teachers of computing
[xx] For these purposes, DfE categorise a percentage of lower than 0.5 percent as 'low'.
[xxi] https://sfia-online.org/en/about-sfia/about-sfia