

# **SOLVING FUTURE SKILLS CHALLENGES**



**Universities UK**

# CONTENTS

Abbreviations	3
Executive summary	4
Introduction	5
Section A: The economy and the world of work are changing rapidly	6
Section B: How do we define the higher level skills needs of the economy?	11
Section C: How is current supply meeting current skills needs?	16
Section D: How will future supply meet future demand?	24
Section E: Implications for the post-18 education and funding system	26
References	29

## ABBREVIATIONS

- **AP** alternative provider (in the tertiary education sector)
- **BIS** Department for Business, Innovation and Skills
- **CBI** Confederation of British Industry
- **CEDEFOP** European Centre for the Development of Vocational Training
- **CIPD** Chartered Institute of Personnel and Development
- **DfE** Department for Education
- **EPSC** European Political Strategy Centre
- **FEC** further education college
- **FSB** Federation of Small Businesses
- **HECSU** Higher Education Careers Service Unit
- **HESA** Higher Education Statistics Agency
- **HMG** Her Majesty's Government
- **HNC** higher national certificate
- **HND** higher national diploma
- **NAO** National Audit Office
- **NCUB** National Centre for Universities and Business
- **OECD** Organisation for Economic Co-operation and Development
- **ONS** Office for National Statistics
- **QAA** Quality Assurance Agency for Higher Education
- **SME** small- and medium-sized enterprise
- **SOC** Standard Occupational Classification
- **SSV** skills-shortage vacancy
- **STEM** science, technology, engineering and mathematics
- **UKCES** UK Commission for Employment and Skills
- **UUK** Universities UK

## EXECUTIVE SUMMARY

The fourth industrial revolution is driving comprehensive change in technology, the nature of work and the demand for skills. The jobs of the future are more likely to require higher level skills, and the supply of these skills will be critical to future success. This critical supply could be disrupted by an ageing population and uncertainty over immigration. These changes are increasingly complex and are occurring at an accelerated pace, with profound challenges to the ability of policymakers, employers, educators and learners to keep up.

Increasing demand for higher level skills will be across a range of subjects, with humanities being as important as science and engineering, and across a range of levels, from sub-degree to postgraduate. Subjects and skills will need to be combined and re-learned throughout working life and the difference between academic and vocational qualifications, which is already blurred, will become less relevant, whereby a ‘whole-skills’ approach needs to be adopted. Subject-specific skills will need to be underpinned by a range of transferable skills. Work experience will be invaluable to developing learners who can apply their knowledge and skills to real-world problems and move easily between learning and working. To succeed in the future, learners will also need to think like employees, and employees will need to think like learners.

The linear model of education–employment–career will no longer be sufficient. The pace of change is accelerating, necessitating more flexible partnerships, quicker responses, different modes of delivery and new combinations of skills and experience. Educators and employers need to collaborate more closely, and develop new and innovative partnerships and flexible learning approaches. Universities are committed to working with employers, of all sizes, and many employers recognise the value of collaborating with universities. These efforts need to be supported, enhanced and developed. Every effort must be made by government to adopt a whole-skills approach and to embed educator–employer partnerships across policy to support this.

*The most important capital for the world of work ahead is skills.*

EPSC, 2016

*Across all subjects of study, the primary purpose for a student entering higher education was to improve their career prospects and as a pathway to career enhancement.*

King’s College London and QAA, 2013

*The education that universities provided in 2014-15 increased the value of graduates’ human capital by some £63 billion (or 28 per cent), relative to its pre-degree value.*

Oxford Economics and UUK, 2017

*[The industrial strategy] helps young people to develop the skills they need to take up the high-paid, high-skilled jobs of the future.*

Prime Minister’s Office, 2017

## INTRODUCTION

The fourth industrial revolution could involve ‘a revolution more comprehensive and all-encompassing than anything we have ever seen’ (World Economic Forum, 2016). The combination of multiple changes, such as through robotics, artificial intelligence and the internet of things, looks set to disrupt whole sectors and organisational structures, and is unlikely to leave many jobs untouched. These changes are likely to drive demand for higher level skills at a time when the UK has an ageing population and uncertainty over immigration policy. These changes are happening at such an increasing pace that policymakers, educators and employers will need to adopt a quicker, more flexible and collaborative ability to respond and will also need to reconsider whether they have the right tools and relationships to succeed.

*...a revolution more comprehensive and all-encompassing than anything we have ever seen.*

These challenges are recognised in the industrial strategy (HMG, 2017), and the review of post-18 education and funding (DfE, 2018) in England is seeking to identify how the government can best support educational outcomes that deliver the ambitions of the industrial strategy, ensuring both a strong economy and the skills our country needs. The ambitions for the industrial strategy include creating better, higher paying jobs in every part of the UK, creating the world’s most innovative economy and addressing the long tail of underperforming businesses, with the government acting in a strategic, partnership-driven role. Higher level skills and universities will be critical to addressing these aims, which will need to be embedded in policy such as sector deals, skills advisory panels and local industrial strategies as part of a whole-skills approach.

This report considers some of the implications of these challenges in terms of the impact on knowledge, skills and careers, and ultimately the future role of universities in meeting workforce demands. It then looks at what skills the UK economy needs, the pattern of existing higher level provision and how effectively this meets current demands, and what shape demand will take in the future. It tests and updates existing models and considers their relevance, given the increased scale of uncertainty.

Universities recognise these needs and are committed to meeting them, delivering a wide range of subjects including significant technical and professional provision at a wide range of levels, including sub-degree and postgraduate. Universities are also committed to engaging and partnering with employers to meet their needs and provide relevant work experience. Often in partnership with employers, they are also working across the tertiary education system and innovating in new models of provision and delivery and creating new pathways to higher level skills. The demand for graduates is robust, as are the benefits of an undergraduate education, but in an uncertain environment, it is difficult to predict future demand. Better intelligence is needed on future skills demands and shortages to help inform the response from educators and employers.

This report uses ‘skills’ as a generic term and label and considers various aspects of higher level skills. When universities, policymakers and employers discuss skills, it can include references to knowledge, qualifications, experiences and attributes. We have used ‘skills’ as shorthand to avoid over-complicating the key messages and themes arising from this report.

## **SECTION A: THE ECONOMY AND THE WORLD OF WORK ARE CHANGING RAPIDLY**

The economy and the world of work are changing rapidly. The impact of technology, the changing needs of a knowledge economy and the need to replace and upskill an ageing workforce are all driving demand for higher level skills. As a country, we need to be aware of the challenges and ready to respond. The change is rapid, and many of the challenges will drive a need for higher level skills and learning throughout life. Universities are extremely well placed to help business (and the economy more widely) to meet these challenges, but they will need to understand these drivers so they can change and adapt. This section explores what these challenges mean for knowledge, skills and careers.

The most prominent challenge is the impact of what is termed the ‘fourth industrial revolution’ (Schwab, 2017), a combination of a number of changes, including automation and robotics, digital technology and the internet of things (House of Commons Library, 2016), as well as artificial intelligence and new technologies such as biotechnology (World Economic Forum, 2016). Some examples of the impact of the fourth industrial revolution are as follows:

- Mobile internet and cloud technology will enable more efficient delivery of services and opportunities to increase workforce productivity, although with the possible negative impact of increasing industrial disruption.
- Advances in computing power will require new systems and capabilities to maximise the full potential of technological change.
- The internet of things will provide enormous amounts of data with the potential to identify patterns and design systems and services on a scale never before possible, but the right workforce and leadership are needed to capitalise on this opportunity.
- Automation and robotics are generally expected to replace mainly low- and medium-skilled roles, especially in sectors such as manufacturing, but are also expected to disrupt all sectors and roles, including higher skilled jobs, while also creating new skill needs and new job roles.

The fourth industrial revolution is driving comprehensive change in technology, the nature of work and the demand for skills. Increasing complexity, which will drive demand for a range of higher level knowledge and skills and the accelerating pace of change, will require more flexible partnerships, quicker responses, different modes of delivery, lifelong learning and re-skilling. Knowledge, skills, industries and jobs will face increased disruption. Managing and responding to this will require an ongoing commitment to development and training from employers and the development of both resilience and a commitment to lifelong learning among employees in closer partnership with universities.

*The rate of change could well outpace the ability of existing policies, mechanisms and approaches to respond adequately.*

One of the key aspects of the fourth industrial revolution that is considered to distinguish this revolution from previous ones is the speed at which change will take place and the level of disruption this will cause. The pace of change has ‘accelerated significantly’ (EPSC, 2016) and the revolution is ‘evolving at an exponential rather than a linear pace’ (Schwab, 2017). Unlike previous industrial revolutions, where policymakers and educators have had decades in which to respond, with the fourth industrial revolution, ‘this may simply not be an option’ (World Economic Forum, 2016).

The rate of change could well outpace the ability of existing policies, mechanisms and approaches to respond adequately. There will always be a ‘time-lag’ between changing skills needs and the response from the educational system and policymakers, but there are concerns that this ‘disconnect’ will increase, and see educational systems ‘increasingly at risk of being outdated’ (World Economic Forum, 2017).

*Educational systems are ‘increasingly at risk of being outdated’.*

Knowledge has become the key driver of economic growth (OECD, 2014), where activities that create value from exploiting knowledge, technology and creativity (rather than physical assets and manual labour) are driving growth in employment (The Work Foundation, 2011). A knowledge-led economy will not only need to recruit an increasing number of higher skilled employees, but will also need to upskill existing workers, with the need to re-skill and upskill the workforce becoming ‘critical’ (World Economic Forum, 2016). Employees will also be working longer, which will reinforce the need to continually re-skill and upskill. These changes will occur within the context of an ageing population, which could exacerbate issues of the supply of talent, as generations of workers retire. One estimate of total replacement demand between 2016 and 2026 stands at 13.1 million openings (Government Office for Science, 2016). These trends will require some fundamental changes to the approaches taken to post-18 education and training, with much more attention paid to the years beyond the immediate post-18 period. Solutions that allow for an increased need for investment in flexible lifelong learning will be required.

The UK, along with other developed countries with ageing populations, has policy challenges around the need for and impact of immigration, in addition to the uncertainty surrounding the Brexit process. There is a worldwide market for talent. EU immigrants have been more highly skilled than the local UK population, reflecting the demand for higher level skills and 'the EU has offered an important safety valve for organisations that cannot find skilled labour in the UK' (CIPD, 2017).

The impact of Brexit is very difficult to predict. Any decline in economic growth may depress recruitment. Jobs may go overseas, but they could also be 're-shored' back to the UK to enhance domestic supply chains. As well as the potential for EU immigration to decline, existing EU immigrants could leave, and it is unclear whether international immigration would expand to fill any gaps. Professional services, a key recruiter of graduate talent and driver of jobs growth, have been identified as being at particular risk because EU nationals collectively have been identified as the biggest overseas supplier of talent for this sector (CIPD, 2018). Brexit could well undermine the supply of higher level skills from abroad at a time when demand is increasing. Employers and educators will need to widen the talent pool and provide better pathways for progression and development.

These challenges require a policy and delivery framework that is flexible, and allows for nimble partnerships between universities, students and employers. This framework will need to balance carefully the need for national consistency and regional responsiveness if we are to thrive as a nation in the coming decades. Having considered some of the overall impacts of these changes, let us consider the impact on some key areas of skills development for universities.

## IMPACTS ON KNOWLEDGE, SKILLS AND CAREERS

For universities, developing subject knowledge is at the heart of the curriculum. The nature of university education includes developing the skills to analyse, interrogate, research, convey and apply knowledge to various problems and circumstances. Alongside these knowledge-related or 'cognitive' skills, universities are committed to developing the transferable skills of learners, including problem-solving, communication and 'learning ability' by embedding them into the curriculum across all subjects (QAA, 2014). Universities provide additional opportunities to develop transferable skills through particular courses or modules, but also through the wider student experience. It is considered essential for vocational and professional practice that learners have a firm grounding in professional knowledge and have the ability to apply this in practice. University careers services play a strong role in supporting the development of skills, and universities have a strong commitment to not only supporting learners in finding their first jobs, but in equipping them to flourish and develop throughout their careers. The changes outlined above will impact upon all of these key university activities.



## Knowledge

The shelf life of relevant and useable knowledge is rapidly diminishing, which presents significant challenges to educators and government to ensure that learners have the skills, knowledge and experiences that are relevant to the workplace as well as intellectual flexibility and adaptability. The World Economic Forum has provided some examples of the impact of this rapid obsolescence (World Economic Forum, 2016):

*By 2020 more than a third of desired core skill sets of most occupations will be comprised of skills that are not yet considered crucial to the job today.*

*65% of children entering primary schools today will ultimately work in new jobs and functions that currently don't exist.*

Not even technical subjects are immune from this change:

*Nearly 50% of the subject knowledge acquired during the first year of a four-year technical degree will be outdated by the time the students graduate.*

*Educators are in the position where they are having to prepare learners for jobs that don't yet exist, using technologies that have not yet been invented.*

Educators are in the position where they are having to prepare learners for:

*jobs that don't yet exist, using technologies that have not yet been invented, and spotting and solving problem that we have yet to define clearly.*

(QAA, 2018)

The potential impact is to make the idea of employers consuming 'work-ready' graduates or the ability of any educator to produce work-ready learners without close collaboration with employers nigh on impossible. It also heightens the importance of core cognitive and transferable skills regardless of the subject studied, and a commitment to lifelong learning. This puts a premium on continual and flexible collaboration, communication and partnership between universities and employers.

## Skills

Jobs are becoming more skills intensive at all levels (CEDEFOP, 2012), with skill requirements expected to increase for most industries (World Economic Forum, 2010): not only are more jobs requiring qualifications, but more jobs are requiring higher level qualifications. This applies both to new and existing jobs, many of which are experiencing a process of 'upskilling'. Technological change is helping to drive this change (OECD, 2014) and is increasing the demand for higher level cognitive skills (OECD, 2016), with a strong link between 'higher order' cognitive skills and future jobs (Nesta/Pearson, 2017).

Higher skilled jobs are seen as the key to future economic growth and prosperity (CEDEFOP, 2012) and are an essential driver of future output and living standards (Government Office for Science, 2017). They are ‘one of, if not the most important factor for [European] competitiveness’ (ibid), contribute towards increased productivity (BIS, 2013), especially at local level (Centre for Cities, 2017), and are more likely to be resilient to automation: ‘the least automatable occupations almost all require professional training and/or tertiary education’ (OECD, 2018).

*The least automatable occupations almost all require professional training and/or tertiary education.*

Given the importance of higher level skills in supporting future economic growth, the demand for skills from employers needs to be driven up (Government Office for Science, 2016b), employers’ ambitions need to be raised (UKCES, 2014a) and managers need to be stimulated to ‘raise their game’ in terms of developing high-value products and services that will in turn require more high-level skills (UKCES, 2014b). “Raising employer demand for skills and fully using the skills that are available is crucial in shifting the UK towards a high skill, high productivity future” (UKCES 2014b). If employers demand for skills are raised, then it will add to the demand for higher level skills that can only be met from a combination of closer collaboration with universities, development of existing employees (often in collaboration with universities) and widening of the talent pool (in which support from universities can play a key role).

*Raising employer demand for skills and fully using the skills that are available is crucial in shifting the UK towards a high skill, high productivity future.*

### Careers

In future, learners entering the job market will have both a larger number and a wider variety of different careers than previous generations (EPSC, 2016). They are also more likely to switch between different careers and to combine careers, perhaps with self-employment. The number of people managing ‘portfolio’ careers is expected to increase (Deloitte, 2014), and only 13% of British people believe that they will be working in traditional ‘9–5’ employment by 2025 (Recruitment and Employment Federation, 2016). Employers are expected to operate with fewer core staff in future and instead bring together flexible expertise around particular projects. The linear career path is expected to ‘cease to exist’ (PWC, 2017), which will require future employees to be flexible, resilient and committed to lifelong learning as a fact of working life.

*The linear career path is expected to ‘cease to exist’.*

This creates multiple challenges to educators. Not only must they develop the skills that graduates need to succeed in the new world of work, such as resilience and a commitment to lifelong learning, but they must also work with employers to ensure continual skill upgrading (OECD, 2012). Those skills now need to include the ability of individuals to manage their own careers. With the pace of change increasing and the need for re-skilling becoming more important, universities also need to consider extending the support they give to students after they have graduated, and supporting cohorts of lifelong learners. Most careers services provide this and many are increasing the length of time they offer support after students graduate.

## SECTION B: HOW DO WE DEFINE THE HIGHER LEVEL SKILLS NEEDS OF THE ECONOMY?

Given the challenges and changes ahead and their scale, it is important to consider what higher level skills employers value and whether universities are meeting these needs. As well as the term 'skills' being a broad term, the skills needs of the economy and employers cover a complexity and diversity of sectors, employers and needs. It is important to both understand what higher level skills include and to consider employers' needs in that context.

### HIGHER LEVEL SKILLS

Higher level skills include qualifications at levels 4 and 5 (including higher national certificates (HNCs), higher national diplomas (HNDs) and foundation degrees), level 6 (bachelor's degrees) and levels 7 and 8 (postgraduate and research degrees). There are also degree apprenticeships currently up to level 7. The framework for higher education qualifications of UK degree-awarding bodies (QAA, 2014), part of the UK Quality code for higher education, outlines the general achievement expected of those who have studied for higher level qualifications, including both in terms of the subject (what we call subject-specific skills) and transferable skills. The framework demonstrates that higher level skills not only include a greater ability to understand increasingly complex subject matter, but also the ability to evaluate, analyse, interrogate and present the subject matter, and at postgraduate level, to create original knowledge. The framework also identifies key transferable skills, such as communication and decision-making, but also initiative and independent learning. The framework is embedded into higher education provision.

Often skills, including higher level skills, are described as being divided between 'academic' and 'vocational' skills, with academic skills being seen as more theoretical, and vocational skills being more occupation focused. This division is also associated with certain sectors, with universities being seen as delivering academic qualifications and further education colleges (FECs) and alternative providers (APs) delivering vocational qualifications.

This 'binary divide' is not helpful in either describing the reality of provision or how educators can meet the skills needs of employers and the economy. Universities deliver a wide range of vocational and professional provision (see section C below), including medicine, science and engineering, and law, education and social work. In the CBI/Pearson survey, employers rated their satisfaction with the technical skills of graduates at 91% compared with 66% satisfaction with the technical skills of school and college leavers (CBI/Pearson, 2017). By the same token, many FECs and APs deliver higher education and have done so successfully for many years.

Qualifications and skills are on a spectrum, with many academic qualifications now having considerable employer input, and many vocational and professional qualifications being delivered by universities. There is an identified need for both detailed subject knowledge and transferable skills to be part of vocational qualifications: ‘many formerly purely technical occupations are expected to show a new demand for creative and interpersonal skills’ (World Economic Forum, 2016). Medicine and engineering are examples where such a binary divide becomes unhelpful. Employers will need all of the skills and qualifications along this spectrum, at different times and in different combinations, and learners and employees will need to be able to move along this spectrum and should be supported in doing so.

All roles require appropriately blended education and training that provide the relevant skills in the following three broad domains, which are unpacked in the following paragraphs.

- subject-specific skills
- professional and technical skills
- core transferable skills

### ***Subject-specific skills***

The understanding of subject knowledge by graduates is valued by employers, with 62% of employers rating it as one of the most important factors when recruiting graduates (CBI/Pearson, 2017). A total of 46% of employers considered academic qualifications to be critical or significant to their organisations, compared with 49% for vocational qualifications (DfE, 2017), although universities deliver both, and both require subject knowledge. This demand also reflects future jobs growth, with three of the five sectors for future jobs growth viewing academic qualifications as more critical than vocational qualifications (ibid); however, in all three sectors, vocational skills were still important, indicating a need for a range of knowledge, skills and provision.

Some occupations require a background in science, technology, engineering and mathematics (STEM). Some require a background in the social sciences and humanities, while others require skills in creativity and languages. Some occupations will require different combinations of these subject skills. A broad base of subject skills is needed at the aggregate level since the specific mix needed is subject to change as employers’ needs change. Future demand will also require a spread and increasing combinations of subjects, with, for example, ‘broad-based knowledge areas such as English language, history, philosophy and administration and management ... associated strongly with occupations projected to see a rise in workforce share’ (Nesta/Pearson, 2017).

Part of the development of academic subject knowledge includes the development of complex thinking, and analytical and cognitive skills that could equally be described as ‘problem-solving’ skills. The subject knowledge is applied to challenges and issues, enabling graduates to critically consider and review knowledge and understanding. These are skills that are developed in all academic subject areas, and in facing increasingly complex challenges, employers value the innovation,

creativity and understanding that these skills can bring. Furthermore, great value has been placed on the skills of arts, humanities and social science graduates because of their broader view of issues and challenges combined with analytical and creative thinking skills (British Academy, 2017).

Universities have an international reputation for their academic standards and quality of provision, with some of the most advanced, long-standing and embedded systems to support the quality and standards of degrees. They embed the analysis, understanding, development, application and evaluation of subject knowledge in all higher level provision from sub-degree to postgraduate level. This is a fundamental part of higher education and is outlined in every subject benchmark and programme specification. For professional and vocational subjects, graduates are also expected to commit to updating and developing that knowledge throughout their professional careers.

### ***Professional and technical skills***

Universities provide many professional and technical qualifications, which are estimated at around 41% of overall provision (see section C below), including provision at levels 4 and 5 (including HNCs, HNDs and foundation degrees). Universities have long-standing links with professional, statutory and regulatory bodies, which reinforces their links with employers. Universities are also delivering the new degree apprenticeships in key areas of skills need such as engineering, digital technology, and leadership and management.

Degree apprenticeships are proving popular among employers, helping to meet the need for higher level skills both in terms of training new staff and upskilling existing staff. Employers and apprentices value the fact that it is a work-based qualification that also confers the award of a degree and in some cases a professional qualification, putting apprentices on an equal footing with graduates in the labour market. There are early indications that degree apprenticeships are increasing social mobility, with apprentices coming from a wider range of backgrounds, and so helping to broaden the talent pool.

The recent Sainsbury Review (HMG, 2016), which sought to both simplify and improve the quality of technical education, identified two separate pathways – academic and technical – as part of its proposal to reorganise, streamline and reinvigorate the technical pathway. The 15 routes into which technical education in England has been organised do not simply cover science and engineering routes, but also cover a wide range of career-focused provision, including business and administration, education, health, and creative occupations and design, all areas where there is substantial university provision. The need to avoid creating barriers between academic and technical education, when employees will increasingly need to combine both, was recognised by the Sainsbury Review, which recommended clear progression routes and ‘bridging provision’. There is also a need for stronger pathways within technical education, in particular between different levels of apprenticeships (NCUB, 2018).

Engineering is an example where there is extensive university provision and there are concerns about future supply. In 2018, the NAO reported that 75,000 people graduated with a STEM degree in 2016, but only 24% were known to be working in STEM occupations within six months (NAO, 2018), indicating potentially the need to both make STEM careers more attractive, but also to address any skills shortages that were undermining the recruitment of STEM graduates.

The NAO report went on to indicate that some of the skills some graduates might lack included softer (transferable) skills and work experience. The importance of transferable skills and work experience was stressed by the Wakeham Review of STEM degree provision and employability (BIS, 2016a), which commented on the need for ‘softer skills such as team-work and project management’ to be embedded in the curriculum and for more employers to offer work experience. This points to the importance of combining subject skills, transferable skills and work experience.

Despite the need to enhance the provision of technical subjects and skills, there is increasing concern about the potential narrow focus of technical and vocational education and recognition of the need for increased flexibility, given industrial and sectoral change. The World Economic Forum has raised the concern that, given the increasingly rapid changes in jobs and skills, placing unemployed youth in particular on apprenticeship provision in certain job categories with targeted skills training may be ‘self-defeating’ (World Economic Forum, 2016). Apprenticeship training, as well as other technical training, needs to include broader and softer skills that will ensure that learners have labour market mobility (BIS, 2016b) or enable progression to, or combination with, courses and programmes that can provide this. Degree apprenticeships are a good model for delivering this combination.

### ***Transferable skills***

The development of transferable or often what are called ‘soft’ skills, is highly valued by employers: they are a ‘universal priority’ (Infosys, 2016) and there is a ‘strong message’ (QAA, 2016) from employers that they want a range of transferable skills alongside academic and technical knowledge. Evidence from the United States indicates that employers not only value transferable skills but see them as important as ‘hard’ or subject-specific skills (Development Economics, 2015). These skills include communication, team-working and leadership skills.

Transferable skills are embedded in university programme specifications, university statements on graduate attributes and subject benchmarks. Transferable skills are developed through the mode of delivery and teaching, wider university experience and through additional modules and provision, often led by the careers service. Over 90% of universities offer skills development services for the enhancement of communication, enterprise, self-awareness and team-working skills (QAA, 2016). Many university careers services are extending the support they give to students for a number of years after they graduate, including support for the acquisition of transferable skills.

The range of skills that the term ‘enterprise’ covers, which includes creativity, adaptability, problem-solving and communication (QAA, 2018), can equally be seen as relevant: employability and soft skills that could be of value to all learners, not just those that want to set up a business. In an increasingly disrupted world of work where companies are looking to ‘self-disrupt’ and engage in ‘perpetual reinvention’ (IBM, 2018) to ensure their future success, and public employers are continually having to review services, enterprise skills can support graduate success by developing resilience and an ability to manage uncertainty.

## THE ADDITIONAL IMPORTANCE OF WORK EXPERIENCE

Another area valued by employers is work experience, with 59% of employers rating it as one of their most important factors when recruiting graduates (CBI/Pearson, 2017). In the Employer Perspectives Survey 2016, 65% of employers rated relevant work experience as critical or significant when recruiting, rating it more highly than academic or vocational qualifications (DfE, 2017). Work experience complements the development of transferable skills and positive attitudes to work. UK employers rate attitudes and aptitudes for work very highly, with 90% citing it as one of their three most important factors when recruiting graduates, and 55% saying it was the single most important factor (CBI/Pearson, 2017). Work experience is also important to a learner’s success, with higher education students who undertook any type of work experience more likely to attain a graduate job (BIS, 2013b).

Universities recognise the value of work placements, with recent research showing that almost all universities offer work experience (98%) or graduate internships (94%), and with 62% embedding work experience in their courses (QAA, 2016). Universities are also innovating in the ways in which they offer work experience, including short-term insight days and work shadowing, collaborative projects and placements, as well as the more traditional sandwich placements (ASET, 2013). University careers services are playing a leading role in developing links with employers and supporting work experience opportunities. Critical to the success of work experience is the willingness of employers to provide it.

### *The work experience ‘gap’.*

There is a significant gap between the value that employers place on work experience and the number of employers willing to offer work experience opportunities (Government Office for Science, 2017):

- In the engineering sector, all employers agree that work placements for graduates enhanced employability, but only 45% were strongly engaged with higher education delivery (BIS, 2016a).
- CIPD research indicates that only 19% of employers are offering work experience to improve future talent pipelines, with large employers twice as likely to offer work experience schemes (28% compared with 13%; CIPD, 2017b).

- The Employer Perspectives Survey (EPS) is more optimistic, with 38% of employers offering work placements, but still well short of the 65% that consider work experience as crucial for recruits.
- Further analysis of the EPS data indicates that there is no gap in the provision of work placement opportunities for employers with 50 employees or more, but below that, the gap between those employers rating work experience as critical and those actually offering it ranges from 5% to 35%, with the highest gap among the smallest employers (DfE, 2017).

It is clear that in order for educators to effectively deliver both transferable skills and provide work experience, they need active partnership with employers (BIS, 2016a). Supporting and encouraging especially smaller employers to offer work placements, perhaps through networks and collaboration, should be a policy priority.

## SECTION C: HOW IS CURRENT SUPPLY MEETING CURRENT SKILLS NEEDS?

### INTRODUCTION TO THE PATTERN OF HIGHER LEVEL PROVISION

Before considering the data relating to specific skills and skills categories and modelling future demands, it is helpful to understand the current patterns of higher level qualifications which in part reflect student demand and choice as well as the way in which higher education is funded and regulated. The data presented in this section shows that in England:

- the proportion of higher education students studying for a first degree has increased from 63% to 66%, and those studying other undergraduate qualifications has declined from 16% to 12% over the last five years
- for other undergraduate qualifications, the total numbers fell across all provider types
- there have been large falls in part-time first degree and other undergraduate qualification numbers
- universities offer the widest range of subject areas, with provision at FECs and APs more likely to be concentrated in a smaller range of subject areas
- 41% of provision at universities has a professional or technical element compared with 53% at FECs and 25% at APs



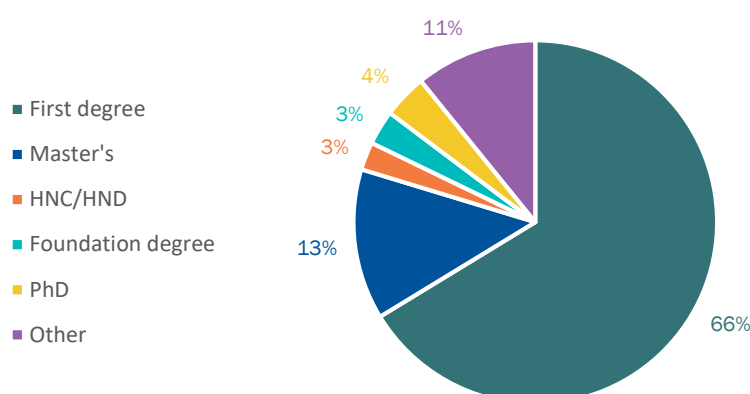
The analysis and evidence presented in this report suggest that the current post-18 education and funding system in England is meeting the higher level and transferable skills needs well in terms of graduate outcomes. However, there is evidence that the current system is performing less well at delivering subject-specific and professional and technical skills needs or diversity in mode or level of higher education study. How the system and funding could change to better meet these challenges is explored in section E.

### *Current supply of higher level skills*

There are three main types of provider in the post-18 education sector delivering higher education and producing highly skilled graduates: higher education institutions (HEIs), further education colleges (FECs) and alternative providers (APs). In 2016/17, there were just over 2 million students studying on a publicly funded higher education course in England, with just over 90% of these doing so at an HEI, with the rest studying at either an FEC or an AP (HESA, 2017).

Figure 1 breaks down what type of courses these students are studying: 66% are studying towards a first degree, 13% for a master's degree, 11% for other qualifications, 4% for a PhD, 3% for a foundation degree and 3% for an HNC or HND. The other category here consists of a wide range of qualifications including certificates and diplomas that primarily related to continuing professional development qualifications. When considered by level of qualification, over 83% of students are studying for a qualification at level 6 or higher (ie, first degree, master's, PhD and some qualifications in the other category).

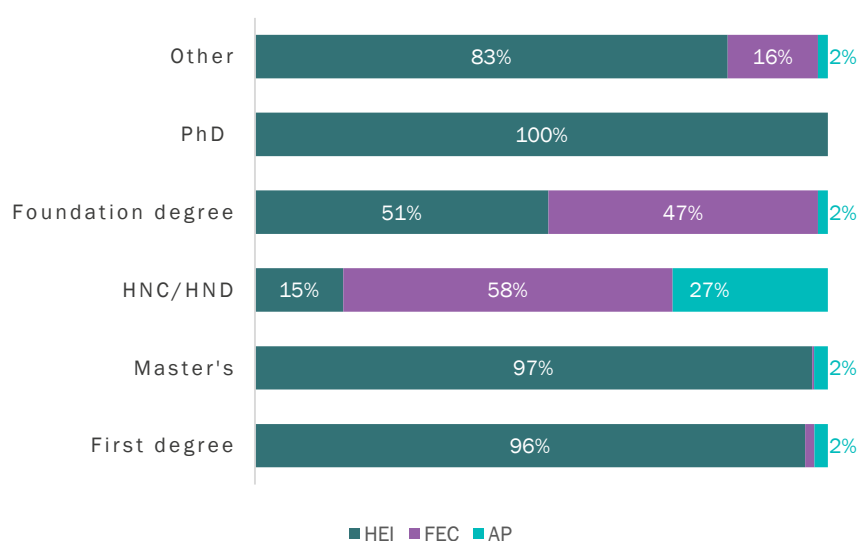
Figure 1: Students on higher education courses in England by qualification type, 2016/17



Source: HESA student record 2016/17; ILR 2016/17; AP statistics 2016/17

While universities educate a clear majority of these students, the proportion of students studying at different providers does vary by qualification. Universities educate all, or close to all students studying for first degrees, master's degrees and PhDs, but a smaller proportion of those studying on qualifications at levels 4 and 5 such as foundation degrees (51%) and HNC and HNDs (15%) (Figure 2).

Figure 2: Qualification by provider type in England, 2016-17



Source: HESA student record 2016/17; ILR 2016/17; AP statistics 2016/17

The total number of students studying for a higher education qualification at all types of provider has changed over time, increasing by approximately 42,000 between 2012/13 and 2016/17. The numbers of those studying for postgraduate or first-degree qualifications have increased in this period, while those studying for other undergraduate qualifications (such as HNCs or HNDs and foundation degrees) have decreased. This has led to a change in the profile of the types of qualifications being studied: while the proportion of higher education students studying for a postgraduate qualification has remained steady at 22% over this period, the proportions studying for a first degree or other undergraduate qualification have changed from 63% and 16% respectively in 2012/13 to 66% and 12% in 2016/17.

These changes have not been consistent across all provider types.

In 2012/13, 99% of all postgraduate qualifications were delivered by universities. This still stood at 98% in 2016/17, with a slight increase in the proportion delivered by alternative providers. More significant shifts have been observed for first degrees and other undergraduate qualifications. While all provider types saw an increase in absolute numbers studying for first degrees over this period, the proportional share of these offered by alternative providers increased. For other undergraduate qualifications, the number studying for these qualifications decreased across all provider types, with numbers decreasing the most at HEIs.

### ***How well is this supply meeting demand for higher level skills***

In overall terms the demand for higher level skills and satisfaction with graduates are positive. In 2016, 440,000 new professional level jobs were created, yet there were only 316,690 first-degree UK-based graduates,

leaving a recruitment gap of 123,310, more than double the gap in 2015. These figures do not include replacement demand for retiring workers which will create millions of additional vacancies over the next few years nor does it take account of graduates going on to postgraduate education, both of which make the gap wider.

There is positive evidence to support the current success of graduates in meeting the needs of employers and the economy. Graduates, compared with people who left education with lower or no qualifications, are:

- more likely to be employed
- less likely to be looking for work
- much less likely to be out of the labour force (ONS, 2017)

Evidence to support current graduate success includes the following:

- Graduates earn significantly more than non-graduates, earning on average £10,000 more each year (DfE, 2018).
- Despite an increasing participation rate, research has found no evidence of diminished economic benefits to individuals, with the graduate premium (defined as the lifetime economic benefit for graduates relative to non-graduates) remaining constant despite significant increases in graduate numbers (Blundell, Green and Jin, 2016).
- In 2013, the graduate premium was estimated to be £168,000 for men and £252,000 for women (BIS, 2013c).
- Graduates have a significantly higher employment rates and significantly lower unemployment rates than non-graduates (at 5.3%, the unemployment rate is the lowest for graduates since 1989) (HECSU, 2017).
- Graduates are successful in getting professional jobs, with 84% of graduates in professional employment three and a half years after they have graduated (HESA, 2017b).

The UK has a skills gap which an increase in graduates could help to plug. The Employer skills survey, conducted every two years, provides information on employer demand for skills, including vacancies, skills shortages, employee skill gaps and underutilisation. The last survey for which results are currently available was conducted in 2015 (UKCES, 2016). This survey found that 19% of UK employers had at least one vacancy, representing a vacancy density (the number of vacancies as a percentage of total employment) of 3.3%. Both values had increased significantly since the 2013 survey, when 15% of employers reported vacancies, representing a density of 2.4%.

The survey also asks employers whether any of these vacancies are ‘hard to fill’, and subsequently whether these hard-to-fill vacancies are the result of a shortage of skills, further defined as a skills-shortage vacancy (SSV). In 2015, 33% of all vacancies were found to be hard to fill, and of these vacancies, 69% were further defined as SSVs.

The importance of higher level skills to economic growth can be demonstrated by the fact that over the past 20 years, the three job categories that employ the most graduates (ie, managerial, professional and associate professional) accounted for 85% of the net jobs growth (Government Office for Science, 2016a), and in the period 1986 to 2006, the proportion of jobs requiring graduate qualifications doubled (ibid). In the 11 years up to 2016, 2.5 million professional jobs were created in the UK (HECSU, 2017).

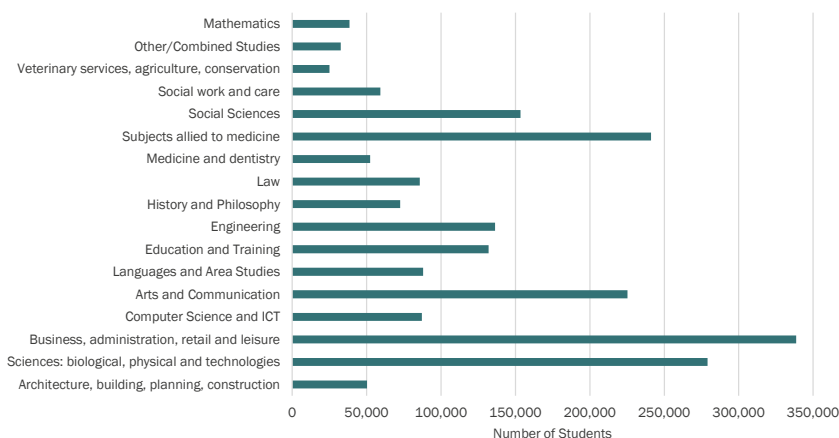
Feedback from employers is that despite the increase in the number of higher education graduates, demand for their skills is high and is set to increase. Two separate surveys – one of the 100 most-sought-after graduate employers (High Fliers Research, 2018) and the other of over 100 of the largest student employers (Institute of Student Employers, 2018) – suggest respectively that employers expect to increase their graduate recruitment by 4% and 11% in 2018.

## SUBJECT-SPECIFIC SKILLS

### *Current supply of subject-specific skills*

The number of students studying for a higher education qualification varies significantly by subject area (Figure 3). Across all providers, the largest subject areas are business, administration, retail and leisure, with approximately 340,000 students, and the sciences, with 280,000. The smallest subject area (with 25,000 students) is veterinary services, agriculture and conservation.

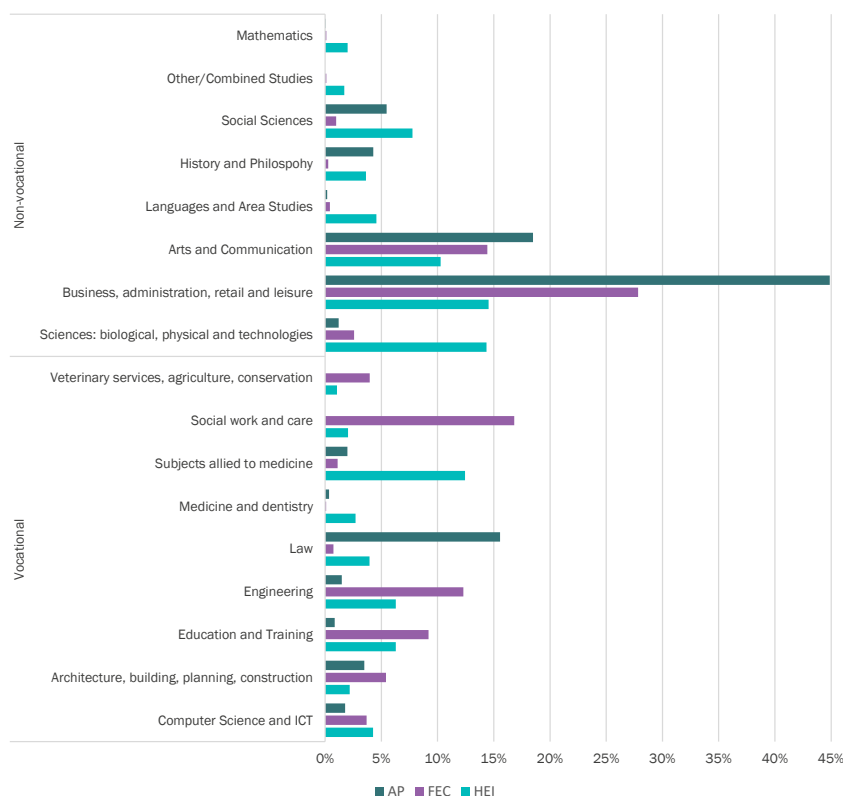
Figure 3: Numbers of HE students in England studying by subject area, 2016/17



Source: HESA student record 2016/17; ILR 2016/17; AP statistics 2016/17

The range and proportion of subjects vary by provider type. Collectively, FECs and APs tend to have higher concentrations of business and administration, and arts and communications courses, while HEIs tend to offer a more even distribution across all subject areas. These proportions are illustrated in Figure 4.

Figure 4: Proportion of students on vocational and non-vocational courses in England at level 4 or above by provider type, 2016-17



Source: HESA student record 2016/17; ILR 2016/17; AP statistics 2016/17

### ***How well is this supply meeting demand for subject-specific skills?***

Given the growth in professional jobs and the demand for higher level skills, it is not surprising that there are already shortages of graduates in a number of areas, including primary and nursery education, medicine, web design and civil engineering (HECSU, 2017). These shortages could be exacerbated by the significant replacement demand expected across all sectors because of the UK's ageing population. Certain employer groups report subject-specific skills shortages. For instance, there are currently 42,000 vacancies in the NHS for nurses, midwives and allied health professionals in England (Public Health England, 2017), and 73% of manufacturers have struggled to fill engineering roles in the past three years (EEF, 2018).

It is important to remember that supply of subject-specific skills is not the only factor that will affect an employer's ability to recruit – graduate choice is also a crucial factor. As the publication *What do graduates do?* highlights, only 41% of electrical and electronic engineering graduates

were working as engineers six months after graduation (HECSU, 2017). This is despite there being numerous jobs available and employers reporting a skills shortage in this area. More work is required to understand why this mismatch persists in some areas and to ascertain the extent to which this is a supply- or demand-side issue.

## PROFESSIONAL AND TECHNICAL SKILLS

### *Current supply of professional and technical skills*

Another important question raised by the post-18 review is the extent to which the current system adequately delivers technical and professional education. Figure 4 breaks subjects down into those we can consider to be either professional or technical in nature and those that are more academic. This analysis shows that 41% of provision at universities has a professional or technical element, compared with 53% at FECs and 25% at APs.

Universities have a long tradition of delivering professional and technical education across a number of professions, including engineering, health and education. The links universities have with professions and professional bodies support employer engagement that enables employment-focused provision and skills, but also sets up a framework for future professional development, so underpinning lifelong learning.

### *How well is current supply meeting demand for professional and technical skills?*

In 2016, the government set out the case for the reform of the technical education system (DfE, 2016). It cited the UK's relatively poor performance internationally in the area of intermediate and technical skills and reported that the most common reason cited by employers for a skills-shortage vacancy was a lack of 'specialist skills or knowledge needed to perform the job role' (ibid).

The government continues to implement a range of changes to the technical education system aimed at improving this situation. These include the introduction of the apprenticeship levy and the planned introduction of T-levels from 2020. As yet, however, there is no evidence that the apprenticeship levy has increased numbers undertaking apprenticeships, with the opposite currently being true. For every month so far in the 2017/18 academic year, the number of apprenticeship starts has been consistently lower than for the equivalent month in the 2016/17 academic year (DfE, 2018b), although there has been a substantial increase in the number of degree apprenticeship starts.

## TRANSFERABLE SKILLS

### *Current supply of transferable skills*

In addition to subject-specific content, every higher education programme will also specify the range of transferable skills that will be developed through its study. These programme specifications will have been developed to incorporate requirements from QAA subject benchmark statements, the requirements of professional and regulatory bodies and the UK Quality code for higher education. Universities frequently involve and consult both employers and students when developing or refreshing programme specifications.

Universities are also increasingly developing sets of graduate attributes and incorporating these into programme and course design as well as specific employability-related services and support. Over 90% of universities offer skills development services for the enhancement of communication, enterprise, self-awareness and team-working skills (QAA, 2016), and 90% of universities support student business, enterprise and entrepreneurship. Of those, more than two-thirds use small business owners as mentors (FSB, 2016).

### *How well is the current supply meeting demand for transferable skills?*

Employers are generally satisfied with the transferable skills of graduates. Employers surveyed by the CBI and Pearson reported that they were most satisfied with graduates' use of IT (96%), basic numeracy skills (92%) and technical skills (91%). They also reported high levels of satisfaction with graduates' analytical skills (83%), team-working (79%) and problem-solving (79%). Employers did, however, report lower levels of satisfaction with graduates' business and cultural awareness (60%) and foreign language skills (53%).

Graduates also agree that their higher education experience has allowed them to develop transferable skills (HESA, 2017b). Three and half years after graduation, 88% of graduates reported that it had enabled them to take the initiative and personal responsibility in their work, 87% that it had enabled them to communicate effectively in their work and 84% that it had enabled them to solve problems at work.

## SECTION D: HOW WILL FUTURE SUPPLY MEET FUTURE DEMAND?

The review of post-18 education and funding will also need to consider how well placed the system is to meet the future skills need of England. The changes inherent in the fourth industrial revolution will not only require different skills and continual re-skilling, but will require more skills, especially higher level skills. There has been a drop in middle-level roles and jobs compared with higher and lower skilled roles in what is called the 'hourglass' economy (Resolution Foundation, 2017). Other predictions, in particular around the impact of robotics and artificial intelligence, see lower skilled roles as those most at risk of automation: 'the least automatable occupations almost all require professional training and/or tertiary education' (OECD, 2018). Both of these scenarios have some similar policy conclusions, that there will be an increase in demand for higher level skills and a reduction in middle- or low- skilled roles or both, requiring effective pathways for progression to higher skilled roles.

Many estimates of future skills needs include increased demand for higher level skills and a mix of subjects, skills and experiences:

- Employers have told the CBI that they expect the greatest demand for skills over the next three to five years to be for higher level skills (+75%) and have consistently predicted this increase in demand for the last five years (CBI/Pearson, 2017).
- Excluding the hotels and restaurant sector, which has a relatively low demand for skills, of the four sectors indicating the greatest expected growth (education, health and social work, business services, and financial services), over 50% of employers in each sector see academic qualifications as critical or significant (DfE, 2017).
- By 2030, the UK will have a talent deficit of between 600,000 and 1.2 million workers for both the financial and business services sector and the technology, media and telecommunications sector, and a deficit of up to 600,000 workers for the manufacturing sector (Korn Ferry, 2018).



## FUTURE DEMAND FOR HIGHER LEVEL SKILLS

As evidenced previously in this report, the current demand for higher-level skills is strong. It is highly likely that this demand will rise further in the future, particularly in light of the challenges presented by the Fourth Industrial Revolution, the possible impact of Brexit on immigration, and an ageing population that is placing greater strain on public services and leading to high replacement demand for retiring workers. While it is difficult to accurately quantify this demand, a number of attempts have been made in recent years, with varying results.

In 2015, the Universities UK report *Supply and demand for higher-level skills* (UUK, 2015) used four definitions of a graduate-level job and UKCES data to project future supply relative to demand, and predicted an undersupply of graduates by 2022.

Competing definitions of 'graduate-level job' do exist, and when used to model future demand yield different projections, ranging from under- to oversupply. For example, when using more recent data from the 2016 Working Futures project and two other definitions of graduate-level jobs (Standard Occupational Classification (SOC) 2010 and Green and Henseke (2014)), an oversupply of graduates in some industrial sectors is predicted. Conversely a large undersupply of workforce qualified to levels 4 and 5 is predicted for others. However, this analysis has several limitations which are important to consider.

Firstly, economic conditions and forecasts have changed since the publication of the Working Futures data in 2016, with events such as the UK's decision to leave the European Union and any resultant change in immigration policy likely to impact the modelling. It also fails to take into account technological change and its potential impact on labour force needs in the coming decade. Thirdly, the 2010 Standard Occupational Classification definition of a graduate-level job is now largely out of date, and by the time the ONS update the work for 2020, further changes to what may be considered a professional or technical occupation are likely to occur.

Above all, while there is no doubt that the future demand for higher-level skills across all levels is likely to be high, it is difficult to accurately predict future demand for graduates relative to the number of graduate-level jobs. In an increasingly uncertain economic context, there is a clear need to identify better ways of estimating future demand. The government should facilitate this alongside university-employer collaboration, particularly at the local level and in the Industrial Strategy and Skills Advisory Panels.

## SECTION E: IMPLICATIONS FOR THE POST-18 EDUCATION AND FUNDING SYSTEM

The extent to which the current post-18 education and funding system is able to meet the current and future skills needs of England has been considered for four different types of skills: higher-level, subject-specific, professional and technical, and transferable. Our analysis of existing provision and modelling of future demand and supply leads us to the following observations:

- **Higher level skills** – the current post-18 education and funding system is well placed to meet the current demand for higher level skills, with graduates continuing to be in high demand from employers and achieving good labour market outcomes. Falls in the number of students studying other undergraduate qualifications and those studying part time do raise concerns that the current system is too inflexible. These concerns are supported by analysis of future demand, which predicts a large unmet demand for level 4 and level 5 (sub-bachelor higher education) qualifications.
- **Subject-specific skills** – there is a disparity in the range of subjects supported by different types of higher education provider, with universities delivering the widest range of provision. Despite large numbers of students studying certain subjects, there are still significant reported skills shortage reported in industry.
- **Professional and technical skills** – both HEIs and FECs offer a high proportion of courses that could be considered professional or technical in nature (41% and 53% respectively). The balance of professional and technical areas supported by HEIs and FECs is different between the two providers.
- **Transferable skills** – those graduating from higher education courses tend to have high levels of transferable skills and their and employer satisfaction with these tends to be high.

Based upon these findings, and the additional evidence in this report, if we are going to meet the skills needs of the economy, the review of post-18 education and funding must consider how best to deliver a system that:

- supports a **diverse range** of higher education provision
- promotes **flexible learning** over an individual's lifetime
- supports **joined-up, stronger pathways** into higher education and across academic and technical provision

- provides a **broad skills base**
- encourages and embeds stronger **partnerships** between higher education and employers, especially small- and medium-sized enterprises (SMEs)
- enhances partnerships to develop **transferable skills** and provide **work experience**
- develops better **intelligence** about future demand
- brings higher education, employers and policymakers together to develop more **agile, flexible and responsive** collaboration between the higher education sector and employers

Universities are central to how we respond. They are uniquely placed, with multiple roles to support learners, professions and the broad range of employers, including SMEs. They will need to continue adapting to meet the challenges outlined in this paper but will need strong employer partnerships and a supportive government environment to succeed. In order to deliver the system described above, it will be important that the following recommendations are given due consideration:

- Government plays a key role in providing an overarching strategy that brings together and enhances the range of policies and interventions that support skills development and educator–employer engagement, including higher level skills, to ensure a ‘whole-skills’ policy approach. Pathways, progression routes and bridging provision, avoiding an artificial ‘binary divide’ between academic and vocational education, and enhancing opportunities for learners, should together be an essential part of the skills strategy.
- Government can facilitate the development and sharing of more robust, comprehensive and adaptable intelligence about future skills needs across sectors and localities.
- This approach needs to be supported at both national and local level, including being embedded in sector deals, and with skills advisory boards providing a strong foundation for local industrial strategies.
- Policies to support employers to provide opportunities for work experience should be a priority, especially among SMEs.
- Universities should ensure that they enhance and improve their role through:
  - having an integrated, embedded strategy that captures, builds upon and enhances the feedback and intelligence gained through existing partnerships, draws in advice and evidence at the sectoral, regional and the national level, and drives teaching, learning and course development

- committing to increasing employer advice and input, work experience opportunities, and the delivery of enterprise skills
  - having a co-ordinated, effective and clear employer engagement service
  - extending their relationship with students beyond graduation to include careers advice, skills provision and engagement with alumni to enhance employer advice and input
- Employers need to invest in training, development and partnerships as part of enhancing their talent strategies. Staff at all levels should be encouraged to engage with universities and to enhance their recruitment of talent. More work experience opportunities should be offered and greater collaboration in the development of transferable skills. Sector collaboration should be supported to adopt a collaborative ‘eco-system’ approach to developing skills and enhancing their skills-supply chains.
  - Employers and universities must also test and develop existing partnership approaches and collaborative processes to ensure that they will be both robust and agile enough to succeed in an increasingly uncertain and disrupted future.

In order to develop specific policy recommendations to meet the challenges outlined above, Universities UK will be undertaking a range of research projects and activities over the coming months, including the following:

1. **The economic case for flexible learning** – this project, undertaken in conjunction with the CBI, will look specifically at how the government can encourage learning that is more flexible, and support people to study at different times in their lives.
2. **High-level skills through effective partnerships and pathways** – this work will consider how partnerships between higher education and further education providers are meeting the local skills needs of businesses and how the policy environment can help promote and enhance these partnerships.
3. **Integrating higher level skills and adopting a ‘whole-skills’ approach to local industrial strategies and skills advisory boards** – we will be developing advice and guidance based on practical examples to support the development of effective skills strategies and partnerships at the local level.
4. **Technical and professional education** – this project looks at developing effective links, pathways and bridging provision to ensure effective opportunities for learners and employers.
5. **Enhancing intelligence on employer needs** – this collaborative project aims to ensure a detailed analysis is undertaken of the *Employer skills survey* to provide intelligence for universities, employers and policymakers.

## REFERENCES

- ASET 2013 *Good practice guide for work-based and placement learning in higher education*
- BIS 2013a *The relationship between graduates and economic growth across economies*
- BIS 2013b *Learning from Futuretrack: The impact of work experiences on higher education student outcomes*
- BIS 2013c *The impact of university degrees on the lifecycle of earnings: some further analysis*
- BIS 2016a *Wakeham Review of STEM degree provision and graduate employability*
- BIS 2016b *Research to understand the extent, nature and impact of skills mismatches in the economy*
- Blundell R, Green D A and Jin W 2016 *The puzzle of graduate wages*
- British Academy 2017 *The right skills: Celebrating skills in the arts, humanities and social sciences*
- CBI/Pearson 2017 *Helping the UK to thrive: CBI/Pearson Education and Skills Survey 2017*
- CEDEFOP 2012 *Future skills supply and demand in Europe*
- Centre for Cities 2017 *Why skills should be the primary focus of any industrial strategy*
- CIPD 2017a *Brexit and the labour market: Submission to the House of Lords Select Committee on Economic Affairs*
- CIPD 2017b *Labour market outlook Spring 2017*
- CIPD 2017c *The graduate employment gap: Expectations versus reality*
- CIPD 2018 *Labour market outlook Winter 2017*
- Deloitte 2014 *London Futures: Agiletown: The relentless march of technology and London's response*
- Development Economics 2015 *The value of soft skills to the UK economy*
- DfE 2016 *Technical education reform: The case for change*
- DfE 2017 *Employer Perspectives Survey 2016*
- DfE 2018a *Graduate labour market statistics 2017*
- DfE 2018b *Review of Post-18 Education and Funding: Terms of Reference*
- DfE 2018c *Apprenticeship and levy statistics: March 2018*
- EEF, the Manufacturers' Organisation 2018 *Smart skills spending: Funding for engineering in the HE sector*
- EPSC 2016 *The future of work*
- FSB 2016 *Enterprising Allies: FSB's discussion paper on small business–university engagement*
- Government Office for Science 2016a *The UK skills mix: Current trends and future needs*
- Government Office for Science 2016b *The UK skills system: How well does policy help meet evolving demand?*
- Government Office for Science 2017 *The future of skills and lifelong learning*

- Green, F. and Henseke, G. 2014 *The Changing Graduate Labour Market: Analysis Using a New Indicator of Graduate Jobs*
- HECSU 2017 *What do graduates do?*
- HESA 2017a *Who's studying in HE?*
- HESA 2017b *Destinations of leavers from higher education: Longitudinal survey 2012/13*
- High Fliers Research 2018 *The graduate market in 2018: Annual review of graduate vacancies and starting salaries at the UK's leading employers*
- HMG 2016 *Report of the Independent Panel on Technical Education*
- HMG 2017 *Industrial Strategy: Building a Britain fit for the future* House of Commons Library 2016 *Fourth Industrial Revolution*
- IBM 2018 *Incumbents strike back*
- Infosys 2016 *Amplifying human potential*
- Institute of Student Employers 2018 *ISE Student recruitment pulse survey*
- King's College London and QAA 2013 *Student expectations and perceptions of higher education: Executive summary*
- Korn Ferry 2018 *The global talent crunch*
- NAO 2018 *Delivering STEM skills for the economy*
- NCUB 2018 *Degree apprenticeships: Impacts, challenges and future opportunities*
- Nesta/Pearson 2017 *The future of skills: Employment in 2030*
- OECD 2012 *Trends in job skill demands in OECD countries*
- OECD 2014 *Policy challenges for the next 50 years*
- OCED 2016 *Structural transformation in the OECD*
- OECD 2018 *Automation, skills use and training*
- ONS 2017 *Graduates in the UK labour market: 2017*
- Oxford Economics and UUK 2017 *The economic impact of universities 2014-15*
- Prime Minister's Office 2017 *Record boost to R&D and new transport fund to help build economy fit for the future* Press release 20 November
- Public Health England 2017 *Facing the facts, shaping the future: A draft health and care workforce strategy for England to 2027*
- PWC 2017 *The workforce of the future*
- QAA 2014 *Framework for higher education qualifications of UK degree-awarding bodies*
- QAA 2016 *Evaluating the impact of higher education providers' employability measures*
- QAA 2018 *Enterprise and entrepreneurship education: Guidance for UK higher education providers*
- Recruitment and Employment Federation 2016 *Gig economy: The Uberisation of work*

- Resolution Foundation 2017 *Looking through the hourglass*
- Schwab K 2017 *The fourth industrial revolution*
- The Work Foundation 2011 *A plan for growth in the knowledge economy*
- UKCES 2014a *The labour market story: The state of UK skills*
- UKCES 2014b *The labour market story: Skills use at work*
- UKCES 2016 *Employer skills survey 2015*
- UUK 2015 *Supply and demand for higher level skills*
- World Economic Forum 2010 *Stimulating economies through fostering talent mobility*
- World Economic Forum 2016 *The future of jobs*
- World Economic Forum 2017 *The global human capital report 2017*

Universities UK is the representative organisation for the UK's universities. Founded in 1918, its mission is to be the definitive voice for all universities in the UK, providing high quality leadership and support to its members to promote a successful and diverse higher education sector. With 136 members in England, Wales, Scotland and Northern Ireland, Universities UK promotes the strength and success of UK universities nationally and internationally.

Woburn House, 20 Tavistock Square  
London WC1H 9HQ

Tel: +44 (0)20 7419 4111  
Email: [info@universitiesuk.ac.uk](mailto:info@universitiesuk.ac.uk)  
Website: [www.universitiesuk.ac.uk](http://www.universitiesuk.ac.uk)  
Twitter: @UniversitiesUK

August 2018

ISBN: 978-1-84036-405-7



Universities UK

