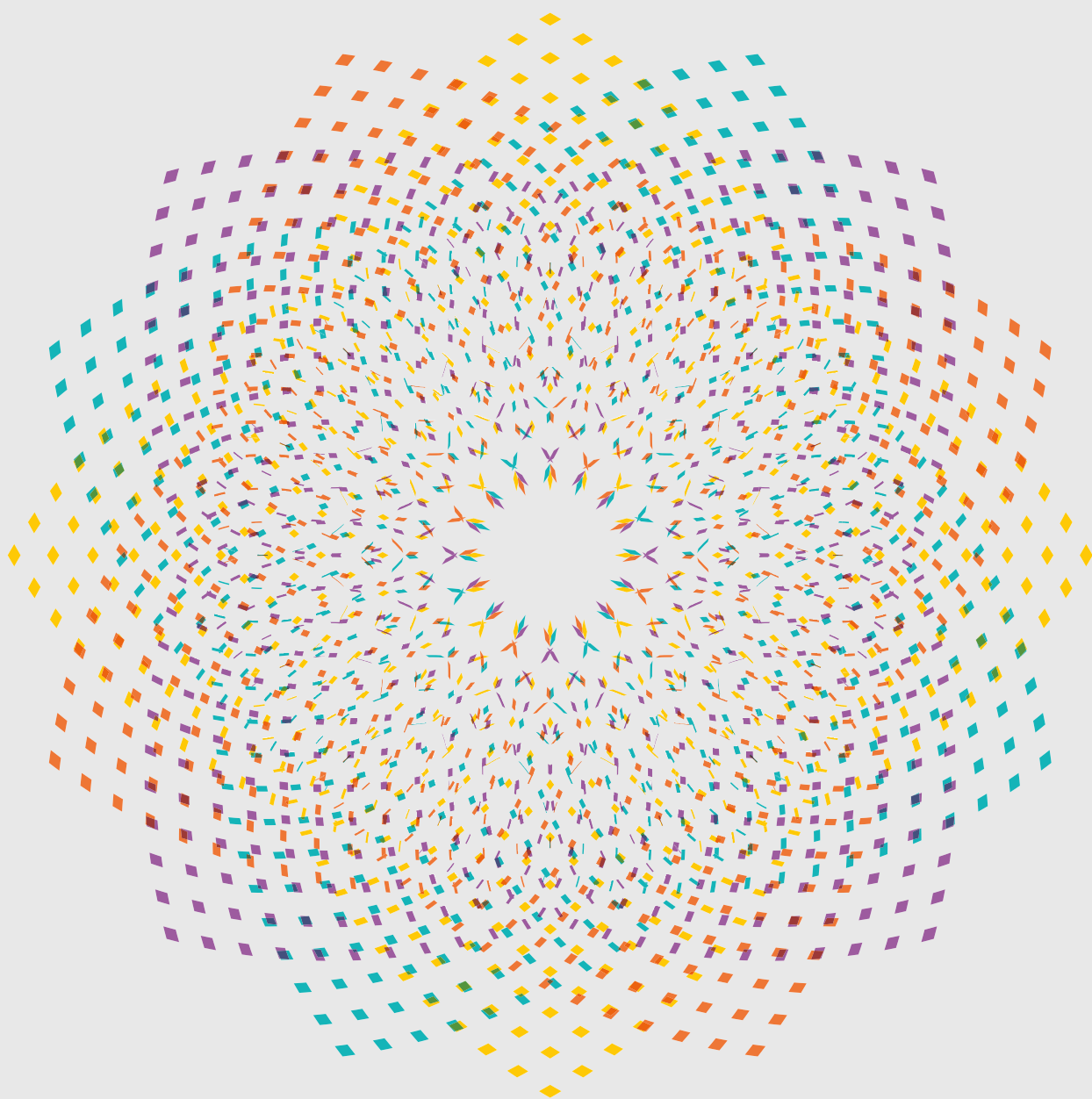


# SUPPLY AND DEMAND FOR HIGHER-LEVEL SKILLS



Universities UK

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## EXECUTIVE SUMMARY

As the UK economy edges out of recession and employment levels begin to rise, attention has increasingly shifted towards the supply of higher-level skills, with several commentators arguing that there are not only too many graduates but that too few of them are prepared for the world of work.

This report provides a general analysis of the supply and demand for higher-level skills, asking whether there are indeed too many or too few graduates, whether their subject choice is suited to future labour market requirements, and to what extent they are lacking the general employability, practical and technical skills required by a modern knowledge economy. The report analyses the supply and demand for higher-level skills through three prisms:

- Qualification levels
- Subject knowledge
- Core and employability skills

It highlights the fact that there is no one definition of a 'graduate job'. Projecting to 2022, the report deploys four common frameworks for identifying 'graduate' or 'professional' occupations and finds that, under most models, there will be a continued undersupply of graduates, relative to the number of jobs demanding them. There will also be unmet demand for workers with higher, but not necessarily degree-level, qualifications, such as BTECs or HNDs. It also points to clear evidence of occupational upskilling, wherein occupational functions – and their attendant skill requirements – rise over time, suggesting that our analysis may actually *underestimate* future demand for graduate talent.

*Our analysis may actually underestimate future demand for graduate talent.*

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Looking at the supply and demand for subject-specific skills, the report examines the extent to which higher education students are on courses that meet labour market demand, and whether certain subjects provide graduates with a larger cache of 'employability skills' than others. It finds that while as many as 27% of current higher education students are on courses related to science, technology, engineering and maths (STEM), there may be a blockage in the talent pipeline: it appears that many are choosing to eschew career paths in industries with a high density of skill shortages.

Graduates in every discipline pick up a diverse array of 'employability skills', including problem-solving, critical analysis and entrepreneurial skills. However, the provision of these is not, as far as we can tell, evenly spread. For example, creative arts students report that through the course of their university education they developed high-level entrepreneurial skills but not necessarily logical thinking, and maths students report that they developed high-level problem-solving skills but not necessarily presentation skills. The provision of these skills is important, not only to graduates but to the wider economy.

Research discussed here points out that graduates lacking certain core and employability skills fare poorly in the labour market, often finding themselves ‘mismatched’ in non-graduate jobs and with lower average earnings than their ‘matched’ graduate counterparts.

Therefore, this report makes six recommendations:

1. There is currently an undersupply of graduates that will continue into the foreseeable future; however this report points to research indicating that as many as 30% of graduates find themselves ‘mismatched’. Although this is lower than many of the self-reported figures cited in the press, the notion that any graduates are mismatched should prompt action from the higher education sector. **There needs to be a better understanding of why certain graduates become mismatched, which skills could prevent this and where they can be best attained.**
2. As part of this, universities and employers need to talk about ‘employability skills’. Terms such as ‘critical analysis’, ‘team working’ and ‘problem-solving’ may be interpreted differently by education providers, industries and occupations. **Universities and employers should jointly develop a ‘skills translation’ exercise to help all parties understand how and where these ‘soft skill’ principles can be practically developed and applied.**
3. This report also shows that alongside a demand for more graduates there will be demand for a greater number of workers with higher – but not necessarily degree-level – qualifications. This points to the need for greater collaboration between further and higher education. **Young people should have the opportunity to develop higher-level skills through a system of integrated pathways between the two forms of provision, one that provides a theoretical underpinning to technical knowledge and offers the chance for upskilling in line with economic, operational and technological change.**
4. To target such policy interventions, **the sector needs both a clearer and a more granular understanding of the size and content of provision across both further and higher education:** what subjects are being offered where, in what modes, and to what extent do these courses dovetail with skills gaps? Universities UK is beginning a research project that will aim to develop evidence on just that.
5. This report also finds that, in spite of a strong supply of STEM students, there are continued shortages of highly-qualified workers in technical industries. **Identifying – and mending – this obstruction in the talent pipeline is crucial.**
6. Finally, we cannot ignore what goes on inside business: **there should be a heightened focus on skills utilisation.** What sort of management and business practices best utilise higher-level skills and how can similar practices be adopted by firms of diverse sizes and sectors? The UK’s higher-level skills base is an immense national asset. The question is how best to utilise it.

*The UK’s higher-level skills base is an immense national asset. The question is how best to utilise it.*

# INTRODUCTION

As the UK economy edges out of recession and employment levels begin to rise, there has been much attention directed towards the current – and projected – supply of higher-level skills. Not all of the attention has been positive, with an array of recent headlines claiming that there are more graduates than ‘graduate jobs’, that students are studying the ‘wrong’ subjects and leaving higher education bereft of the skills required in the world of work. There have also been a growing number of skill shortage vacancies – openings that cannot be filled due to a lack of applicants with the appropriate higher and often technical skillset – leading many to call for a redistribution of students (and funding) from higher education to further education colleges. How empirically grounded is this zero-sum game approach? And is it really the best way to meet labour market needs?

This report attempts to provide a general analysis of the supply and demand for higher-level – and in particular, graduate – skills, asking whether there are indeed too many or too few graduates, whether their subject choice is ill-suited to future labour market requirements, and to what extent they are lacking the general employability, practical and technical skills required by a modern knowledge economy. It asks which policy levers could be deployed in response to the each of these three supply and demand issues. This is in no way an exhaustive analysis of supply and demand, nor a comprehensive discussion of policy responses, but rather an attempt to review the evidence base.

As well as identifying strong demand for graduates, it finds little evidence of a ‘graduate oversupply’ but rather evidence that our economy requires an even greater number of higher qualified workers. It also reveals data suggesting the need for more young people with higher – but not necessarily degree-level – skills such as those at levels 4 and 5. While young people in the UK do indeed suffer from below OECD-average literacy, numeracy and problem-solving skills, these skill deficits do not seem to be affecting young people with higher qualifications in particular. Instead, the skills employers find most lacking in university and college leavers are a mix of job-specific and general employability-related skills; a majority also cite lack of work experience.

Regarding subject choice, there is little evidence that graduates are studying the ‘wrong’ subjects; in fact most are on courses that offer subject knowledge and/or employability skills that are very much in demand. Therefore the questions that the sector needs to ask are 1) how to ensure that all graduates leave higher education with a suitable mix these skills; and 2) how to attract graduates into fields with detrimental labour shortages.

This report’s findings point to more questions than answers, and these questions need to be addressed ahead of any sweeping policy proposals. Few countries have ever considered high-level talent ‘a problem’; instead we need to ask how best to utilise it.

*This report finds little evidence of a ‘graduate oversupply’ but rather evidence that our economy requires an even greater number of higher qualified workers.*

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## Supply and demand

How do we define ‘skills’ and, in particular, ‘higher-level skills’? For the sake of simplicity, this report will adopt the definition of skills as set out in Green and Henseke (2014): ‘knowledge and attitudes as well as technical capabilities.’<sup>1</sup> Of course, defining and measuring ‘higher-level’ skills is a somewhat trickier enterprise; we might think of higher-level skills in terms of:

1. qualification level (eg bachelor’s degree, foundation degree, GCSE)
2. specific core and employability skills (eg literacy, numeracy, problem-solving and leadership)
3. domain or subject-based knowledge

This report will attempt to provide a brief analysis of the supply and demand for higher-level skills according to each of these three measures.

The analyses surrounding the supply and demand for qualifications are, unless otherwise noted, based on three sets of data:

1. current and projected qualification levels in the UK labour force
2. the type and number of current – and projected – jobs in the UK economy
3. the skillset or domain knowledge necessary for each job

While we use the same two datasets on qualifications and job numbers throughout, our analysis varies according to how we conceive the required qualifications for each occupation.

Occupations are, unless otherwise noted, described through the Standard Occupational Classification 2010 (SOC) system. This system has four classification levels: major (one digit, nine categories), sub-major (two digit, 25 categories), minor (three digit, 90 categories) and unit group (four digit, 353 groups)<sup>2</sup>. Data on qualifications are derived from the UK Commission on Employment and Skills (UKCES)<sup>3</sup> and based on the Qualifications Credit Framework (QCF), wherein QCF2 is equivalent to GCSE; QCF3, A-level, international baccalaureate or advanced diploma; QCF4, BTEC professional award level 4/diploma or HNC; QCF5, HND, foundation degree, diploma of higher/further education; QCF6 a bachelor’s degree; QCF7 a master’s degree; and QCF8, a PhD.

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1 Green and Henseke (2014), p.4

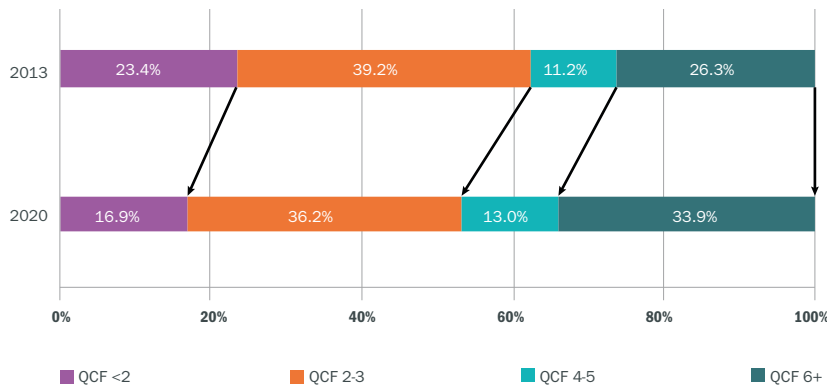
2 There is an additional five-unit code, adapted for the Higher Education Statistics Agency’s (HESA) Destinations of Leavers from Higher Education (DLHE) survey, so as to further disaggregate certain four-digit unit codes. However, it is not analysed in this report as we do not have occupational employment projections at the five-digit level.

3 Unless otherwise noted, Bosworth and Leach (2015)

According to UKCES, the UK is moving towards an increasingly high-skilled labour force, as shown in Figure 1, below. This displays the current and projected qualification mix of the labour force, indicating that by 2020 the UK will see a 10 percentage point decrease in the proportion of the working age population (age 19–64) with qualifications at QCF3 and below, a very small increase (approximately two percentage points) in the proportion with higher-level but sub-degree qualifications, and an eight percentage point increase in the proportion with bachelor's degrees and higher. While this indicates a shift towards a more high-skilled – and in particular, graduate-based – labour force, even by 2020, the majority of the working age population (53%) will still hold zero, low or mid-level qualifications.

*The UK is moving towards an increasingly high-skilled labour force.*

**FIGURE 1:**  
Qualification mix of UK working age population by QCF level, 2013 to 2020



Source: Bosworth and Leach, 2015

Data on jobs growth is derived from the 2014 UKCES *Working Futures* report. At the sub-major level of the SOC 2010 system, UKCES reports the current (2012) composition of jobs in the labour market (eg how many in each occupational category) and then projects the number and composition of these jobs to 2022, based on both expansion demand (newly created jobs) and replacement demand (those created by retirements, etc).<sup>4</sup>

Translating this data to the major level, we see the largest overall jobs growth will mostly occur within SOC 2010 major categories 1 to 3, occupations that the Department for Business, Innovation and Skills (BIS) classifies as high-skilled jobs, although category 6 – caring, leisure and other services – is associated with the biggest increase, likely a reflection of demographic change. The question, then, is how to determine which types of skills and qualifications are required for each type of occupation.

<sup>4</sup> This refers specifically to available jobs, not just those taken up; they exclude occupational mobility. The report notes that 'over the decade as a whole, there is projected to be a net requirement of almost 14½ million new job openings'. (Wilson et al 2014, p.79)

**FIGURE 2:**  
Occupational structure of the UK, 2012 and 2022



Source: Wilson et al, 2014

### Estimating demand for higher-level qualifications

There is no figure that can definitively tell us the number of and type of jobs that will be *required* by the economy. We can proxy this by looking at the share and composition of different occupations in the labour force but of course this is intertwined with supply. For example, UKCES' *Working Futures* states that the 'numbers in employment can be regarded as an indicator of demand', although 'strictly speaking employment levels are the result of a combination of both supply and demand factors; employment would only represent demand if there were excess supply'.

Still, excess supply may not directly indicate that there are 'too many graduates' but could point to specific labour market rigidities and/or classification issues. However, it is clear that the qualification intensity within occupations is growing, regardless of whether it is caused by an increased supply of graduates or an increase in different occupations' skill requirements.<sup>5</sup>

5 UKCES *Working Futures* treats occupational employment structure as an indicator of demand. On the supply side, they project qualification levels by extrapolating from prior trends in attainment; on the demand side they project patterns of employment by qualification level and by, again, extrapolating from prior trends. Accounting for unemployment by qualification and constraining their figures to the number of jobs projected by their occupational figures, they reconcile the 'supply' and 'demand' and find that 'for most occupations the qualification intensity (especially those holding qualifications at QCF 4+) has to be raised to bring demand into balance with supply.' Although, they note that '[t]his is not necessarily indicative of excess supply of such qualifications. The nature of jobs may be changing to make higher qualifications more necessary'. (Wilson et. al, 2014, p.116)



In the interests of simplicity, this report treats ‘demand’ for particular qualifications and subject expertise as the number and composition of jobs that will exist in 2022 (the ‘occupational structure’), according to UKCES projections. However, developing these projections is difficult: they require significant assumptions regarding technological and organisational change and are subject to macroeconomic uncertainty. In fact, UKCES projections vary over time. For example, their 2007 *Working Futures* report, which projected job growth to 2017, predicted that there would be 5.2 million managers, 4.4 million professionals and 4.8 million associate professionals in 2012<sup>6</sup>; following the recession, *Working Futures* 2013 reported that, in 2012, there were 3.3 million managers, 6.3 million professionals and 4.2 million associate professionals. As such, any estimates of supply and demand need to be qualified by the inherent uncertainty in predicting the size and structure of our economy over the next decade.

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6 Wilson et al, 2008

# 1. HIGHER-LEVEL SKILLS AS DEFINED BY QUALIFICATIONS

This first chapter views supply and demand through the lens of qualifications, asking which types of jobs are or will be available for what qualification levels. There are four commonly deployed occupation-qualification frameworks that will be applied to the *Working Futures* occupational structure data:

- SOC 2010
- Graduate Labour Market Statistics published by the Department for Business, Innovation and Skills (BIS)
- Elias and Purcell (2013)
- Green and Henseke (2014)

Whereas the SOC 2010 system allows us to estimate the proportion of jobs that require low, medium, higher-level sub-degree and degree+ qualifications, the remaining three apply a binary distinction between high-skilled jobs and non-high-skilled jobs (BIS) or between graduate jobs and non-graduate jobs (Elias and Purcell 2013 and Green and Henseke 2014).

## What is a graduate job?

There is no widely agreed-upon definition of a graduate job. Figures that purport show the proportion of graduates in graduate – or indeed, non-graduate – occupations vary widely. For example, Green and Henseke (2014) find that approximately 30% of all employed working age UK graduates are in non-graduate occupations while a recent report published by the Chartered Institute for Personnel and Development (CIPD) asserted that as many as 58.8% of UK graduates are in non-graduate jobs. This variation is driven by the array of methods used for classifying ‘graduate jobs’.

One way is to simply ask respondents if they feel their job requires a degree. This was essentially how the 58.8% figure was produced: the European Social Survey asks respondents how many years of education someone would need in order to enter into their current job. Where the respondent answered less than 15–16 years the CIPD authors deemed their job a ‘non-graduate job’, and found that as many as 58.8% of UK graduates responding to the survey are, by that definition, in non-graduate employment – one of the highest levels in Europe. While a helpful indicator for scoping general levels of job satisfaction and skills

*There is no widely agreed-upon definition of a graduate job.*

utilisation,<sup>7</sup> the robustness of self-reported answers has previously been called into question.<sup>8</sup>

Other sources simply apply a blanket categorisation to occupations at the SOC 2010 major category level, stating that only categories 1 and 2 (managerial and professional) or 1 to 3 (managerial, professional, and associate professional and technical) are ‘graduate’ occupations, without necessarily examining the breadth of occupation titles and required skillsets that exist within these large groupings. These blanket classifications can be problematic as there is wide variation within the major and sub-major categories: at the sub-major level a ‘fitness instructor’ is classified the same as an ‘author, writer and translator’. Some sources take a more tautological approach: ‘graduate occupations are those done by graduates’.

More robust frameworks analyse occupations at the more nuanced three and four digit SOC 2010 levels, wherein occupation titles (Elias and Purcell 2013) or skills requirements (Green and Henseke 2014) inform an occupation’s classification. The latter, for example, find that approximately 40% of all UK employment occurs within graduate occupations and that 30% of UK graduates are working in non-graduate occupations – a figure that has held steady since 1997–2001, despite an increase in the number of graduates within the UK labour force.

## 1.1 SOC 2010

The SOC 2010 system attaches general qualification requirements to occupations at the sub-major level (which contains 25 occupational categories), which range from 1 (compulsory education and little training) to 4 (degree required).<sup>9</sup> Under this framework, occupations requiring a degree are entirely concentrated within SOC 2010 major categories 1 and 2 (managerial and professional), despite evidence (see sections 1.3 and 1.4) that a high proportion of jobs in major category 3 (associate professional and technical) also require a degree.

The nuances of attaching qualification requirements to different occupations are further reduced by the level at which the SOC 2010

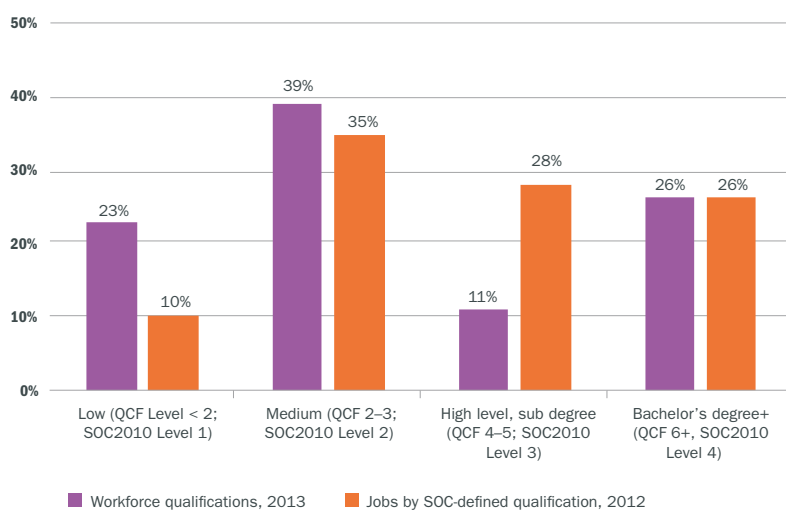
7 Indeed, the CIPD report includes several alternative methods for measuring graduate skills utilisation and over qualification, which were not as widely reported in the media.

8 For example, the OECD 2013 Survey of Adult Skills found that although 30% of workers in England and Northern Ireland reported having higher qualifications than those necessary to do their job, fewer than 10% possessed literacy proficiency above the minimum threshold that is, according to the OECD, required for their job. OECD (2013) United Kingdom (England/N.Ireland) in *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris, p.5

9 There are four skill levels: the first is typically associated with compulsory education and ‘short periods of work-related training’, the second also requires compulsory education albeit with ‘a longer period of work-related training or work experience’, the third is associated with ‘a period of post-compulsory education but not normally to degree level’, and jobs at the fourth level ‘normally require a degree or equivalent period of relevant work experience’. See detailed requirements at: <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/soc2010-volume-1-structure-and-descriptions-of-unit-groups/index.html#5>

system attaches skill requirements to occupations: whereas most academic analyses do so at the three, four or five digit level, this system does so at the two digit, sub-major level. While the SOC 2010 system classifies the entire third major category – associate professional and technical – as not requiring a degree, more nuanced frameworks, such as Elias and Purcell (2013) and Green and Henseke (2014) (sections 1.3 and 1.4) find that 40% and 86% respectively of the occupations that it includes are graduate jobs.

**FIGURE 3:**  
Share of UK jobs by SOC 2010 qualification requirements, 2012



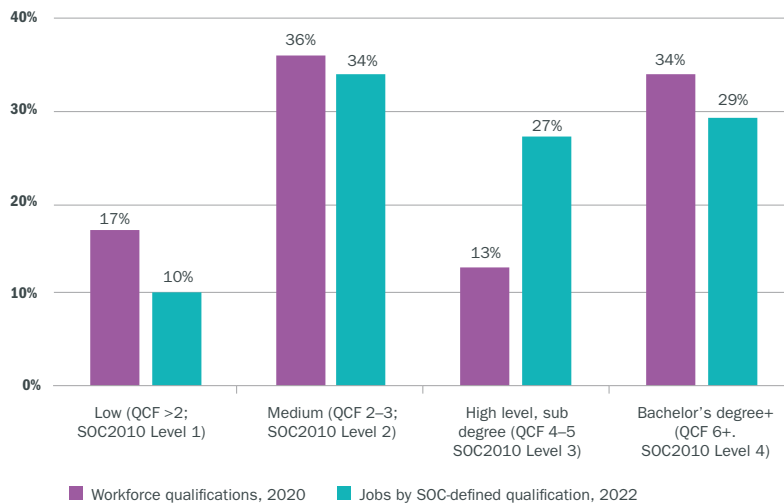
Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, SOC 2010

We interpret SOC Level 4 as requiring a degree (QCF 6+) and SOC Level 3, which requires ‘post-compulsory education but not normally to degree level’, as referring to QCF 4 and 5, though this is a very coarse assumption. Applying the SOC 2010 qualification requirements to the UKCES qualifications and jobs growth datasets, we see that in 2012 there was a 17 percentage point oversupply in the share of the workforce with low and mid-level qualifications, as compared to a 17 percentage point undersupply in the proportion of the working age population with high-level but sub-degree (QCF 4 and 5) qualifications, and a near equivalency between the proportion of jobs that require a degree and the proportion of the working age population that has one.

Projecting to 2020, we see a continued, albeit reduced, oversupply of low and medium-qualifications (+9 percentage points), an outstanding albeit slightly reduced undersupply of workers with QCF 4 and 5 qualifications (-14 percentage points), and a slight oversupply of workers with degrees and higher (+5 percentage points). It is difficult to tell where exactly the projected QCF 4 and 5 undersupply comes from. The data indicates that 42% of these jobs will be in largely white-collar occupations (at the SOC 2010 sub-major category these

are ‘business and public service associate professionals’ and ‘other managers and proprietors’) whereas 26% will be in skilled metal and skilled construction occupations. However, we do not have an indication of the proportions of the labour force both qualified to this level and in those specific subjects.

**FIGURE 4:**  
Share of UK jobs by SOC 2010 qualification requirements, 2022



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, SOC 2010

Of course these estimates, like the others analysed in this chapter, treat an occupation’s skill and qualification requirements as fixed, ignoring the possibility that they may increase or decrease over time. Analyses, such as Green and Henseke (2014), have shown that occupations’ skill requirements increased between the late 1990s and 2012 (see section 1.3); however, these shifts are very difficult to predict, and thus we do not account for them here.

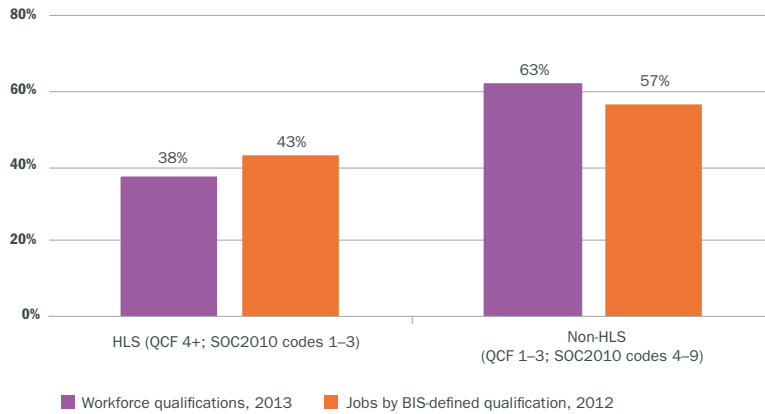
*Analyses have shown that occupations’ skill requirements increased between the late 1990s and 2012; however, these shifts are very difficult to predict.*

## 1.2 BIS

‘Graduate Labour Market Statistics’ (GLMS), an analysis of the Office of National Statistics (ONS) Labour Force Survey published quarterly by the Department for Business, Innovation and Skills (BIS), categorises the labour force into ‘non-graduate’, ‘graduate’ and ‘postgraduate’, and tracks their progress according to a binary jobs classification: high-skilled or non-high-skilled. High-skilled jobs are those in SOC 2010 major categories 1–3 (managerial, professional and associate professional). Using this occupation–qualification framework, we see that when we aggregate all high-skilled working age persons into one category (QCF4+), the proportion of jobs requiring these skills is larger than the proportion of working age people with these qualifications; the reverse exists for non-high skilled jobs, as classified by BIS.

**FIGURE 5:**

Share of UK jobs by BIS-defined qualification, 2012

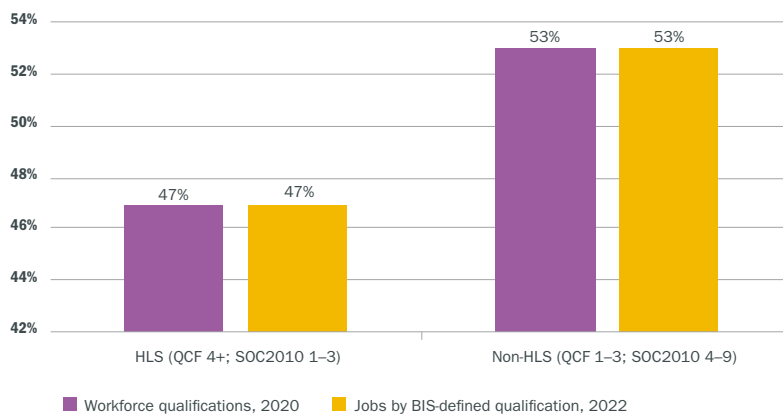


Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, BIS 2015

These differences are significantly reduced by 2020, due to growth in the number of higher-qualified persons and high-skilled jobs, against a decline in the amount of lower-skilled adults.

**FIGURE 6:**

Share of UK jobs by BIS-defined qualification, 2022



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, BIS 2015

While this indicates that the overall shift towards a higher-skilled labour force is indeed necessary, its lack of granularity tells us little about which specific qualifications within the QCF 4+ category will be required over the next decade (although, as noted above, shifting occupational requirements add a hint of uncertainty to such projections).

### 1.3 Elias and Purcell (2013)

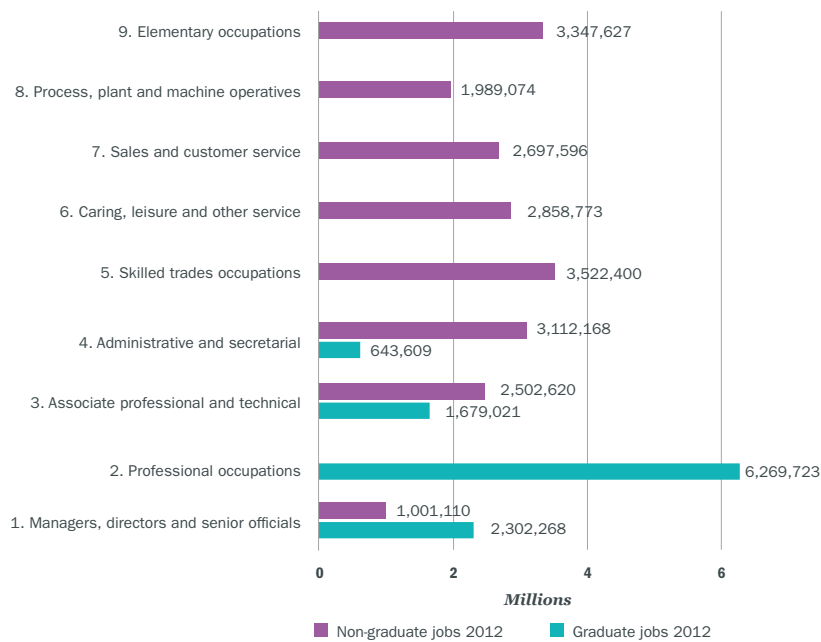
The third occupation-qualification framework is derived from Elias and Purcell, who developed a much-cited graduate jobs classifier in 2004 and updated their method in a 2013 paper. The authors used a framework that included expert judgements of job titles and scored each four-digit SOC 2010 unit group in order to determine whether an occupation is

a ‘graduate job’, or not.<sup>10</sup> Whereas no occupations under SOC major category 3 (associate professional) are categorised as ‘graduate’ under the SOC 2010 system but all of them were categorised as ‘high skill’, under the BIS GLMS system, Elias and Purcell find that 26 out of 65 (40%) associated professional occupations are graduate level, as are 2 out of 25 (8%) of major category 4 (administrative and secretarial).

The authors use the Futuretrack Wave IV surveys as well as UK Labour Force Surveys as a reference through which to track the numbers employed in graduate jobs; finding that non-graduate jobs comprise approximately 60% of all full-time jobs and that 40% of jobs currently require a degree.

**FIGURE 7:**

Qualification requirements by SOC 2010 major category, Elias and Purcell (2012)



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, Elias and Purcell 2013

When applying Elias and Purcell’s occupation-qualification framework to the *Working Futures* data, the proportion of graduate jobs is slightly smaller: 34.1% (or 10.9 million) of jobs in 2012 and 37.1% (17.2 million) in 2022. From the authors’ four-digit SOC occupation classification, we can translate the proportion of graduate/non-graduate occupations into each two-digit (sub-major), and then one-digit SOC (major) category. While all jobs in the ‘professional’ category are graduate-level, there are splits within the managerial, associate

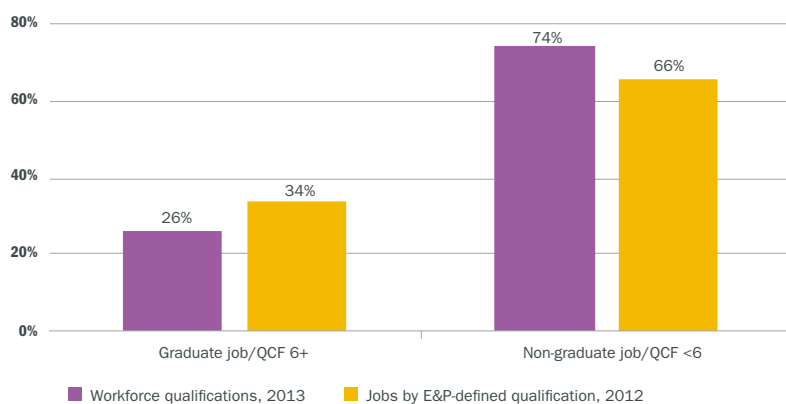
<sup>10</sup> They updated their previous jobs analysis by conducting 220 interviews with higher education graduates in order to assess different clusters of skills employed by graduates in the knowledge economy. Having identified three clusters – ‘specialist expertise deriving from HE knowledge’, the ‘orchestration of knowledge’ and the ‘communication of knowledge’, the authors used a framework of expert judgements to score each four-digit SOC unit group, from 1 to 9, according to the extent that it requires each of the three abilities. A minimum score of 6 is required on at least one of the abilities for the occupation to be considered a ‘graduate job’.

professional, and administrative and secretarial categories (the latter traditionally not considered a graduate category but one in which there may have been significant upskilling in recent years).

How does Elias and Purcell’s framework match up against the supply of graduate qualifications? When we compare the proportion of the population with a degree against the proportion of jobs requiring a degree, there appears to be an undersupply of graduates: 34% of jobs require a degree or above whereas just 26% of the working age population has such qualifications. By contrast, there is an eight percentage point oversupply in the proportion of the workforce with sub-degree-level qualifications.

*There appears to be an undersupply of graduates: 34% of jobs require a degree or above whereas just 26% of the working age population has such qualifications.*

**FIGURE 8:** Share of UK jobs by Elias and Purcell-defined qualification requirements, 2012



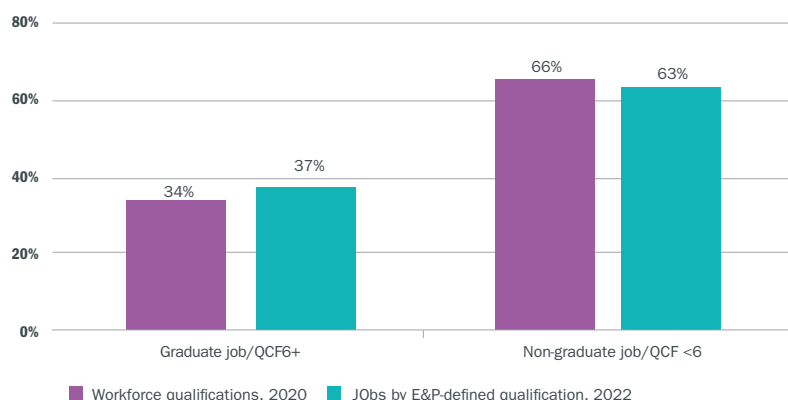
Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, Elias and Purcell 2013

This trend continues to 2020/22: when looking specifically at those who have at least a bachelor’s degree we see that although the number of graduates has grown, so has the proportion of graduate jobs – albeit to a lesser extent (eight percentage point increase in graduates, three percentage point increase in graduate jobs). The oversupply of non-graduates to non-graduate jobs is reduced to three percentage points, but remains nonetheless. Again, however, this could understate demand for graduates as occupational skill requirements are held as constant and do not account for shifts in occupations’ skill requirements.



**FIGURE 9:**

Share of UK jobs by Elias and Purcell-defined qualification requirements, 2022



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, Elias and Purcell 2013

## 1.4 Green and Henseke

The final occupation-qualification framework comes from Green and Henseke (2014): like Elias and Purcell, Green and Henseke attach skill requirements at the SOC 2010 four-digit unit group level and divide jobs into ‘graduate’ and ‘non-graduate’, wherein graduate roles are those where ‘a substantial portion of the skills used are normally acquired in the course of higher education, its accoutrements and its aftermath.’<sup>11</sup> The authors developed a new index for classifying the use of high-level skills based on respondents’ use of high-level literacy skills, high-level professional communication skills, high-level self-planning skills, supervisor responsibilities, use of specialist knowledge, the requirement to develop new skills and knowledge, high or advanced computer usage, and long prior training in their job.<sup>12</sup> They find that, unsurprisingly, most occupations within SOC 2010 major groups 1 (managerial) and 2 (professional) remain graduate jobs and that 56 of the 65 occupations (86%) classified under major group 3 (associate professional), which are often considered post-secondary but sub-degree (such as in the SOC 2010 system), are in fact graduate jobs.

<sup>11</sup> Green and Henseke 2014, 4

<sup>12</sup> Using a linear probability model these responses are then combined with data on whether respondents stated a degree was essential to their job, producing an average score for each of the 353 SOC 2010 unit groups. The unit groups were divided into two clusters: graduate jobs and non-graduate jobs and these results are assessed between 1997 and 2012, allowing the authors to show instances of a particular unit group’s high level skills requirement increasing (or decreasing) over time.

**FIGURE 10:**

Qualification requirements by SOC 2010 major category, Green and Henseke



Source: Author calculation from Wilson et al 2014, Green and Henseke 2014

Moreover, there is evidence of upskilling in particular occupations; for example, using their new framework the authors find that quality assurance managers and conservation managers would not have been classified as graduate jobs during the 1990s but their skill usage has evolved to the extent that they now do require graduate-level skills. Where graduate occupations comprised approximately 37% of all four-digit occupational categories during 1997/2001, the authors find that they made up 40% by 2006/12.

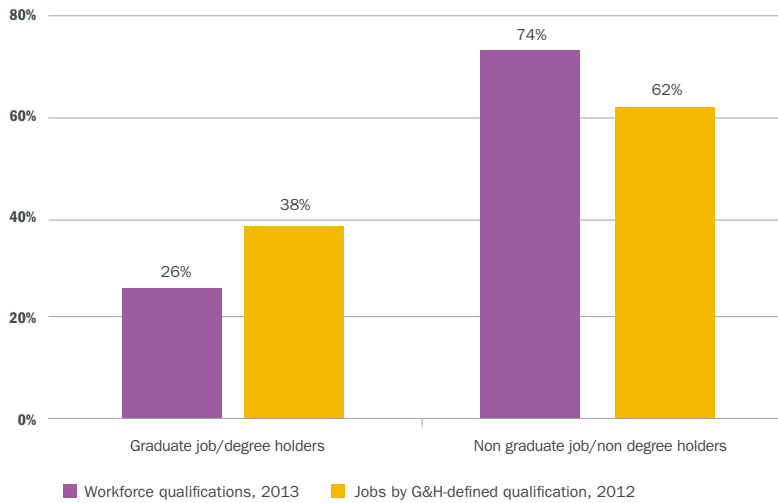
Applying their data to Labour Force Surveys they find that during the period 2006–12, 40% of the labour force were in graduate jobs, as compared to 32% in the period 1997–2001. Looking at the expansion of graduate jobs, the authors find that approximately 40% of additional graduate employment was due to occupational upskilling rather than the expansion of jobs that have previously been classified as ‘graduate’ or by qualification inflation (sometimes referred to as ‘credentialism’).

If we apply Green and Henseke’s occupation–qualification framework to *Working Futures*’ occupational structure data we see that in 2012 graduate jobs comprised approximately 38% of all employment and will comprise over 40% in 2022. This is slightly higher than the proportion of graduate jobs found when applying Elias and Purcell’s framework to the *Working Futures* occupational structure data, though lower than either Elias and Purcell or Green and Henseke’s own estimates of the current proportion of graduate jobs in the labour force, as derived from Labour Force Survey data.

*Approximately 40% of additional graduate employment was due to occupational upskilling rather than the expansion of jobs that have previously been classified as ‘graduate’ or by qualification inflation.*

How does Green and Henseke’s qualification framework match up against the supply of higher-level skills? In 2012, degree holders made up 26% of the working age population against the 38% of jobs classified as graduate; by contrast non-degree holders comprised 74% of the working age population, against the 62% of non-graduate jobs.

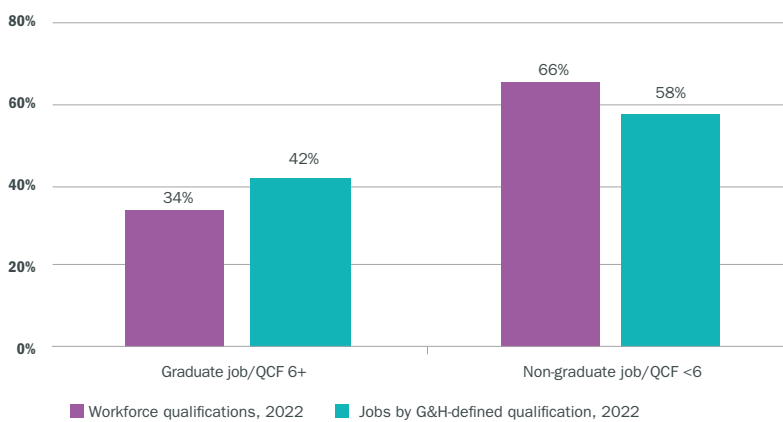
**FIGURE 11:**  
Share of UK jobs by Green and Henseke-defined qualification requirements, 2012



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, Green and Henseke 2014

When we project to 2022, the surplus of graduate jobs to graduates remains, however the gap has narrowed as the proportion of graduates grew slightly faster than graduate jobs (eight percentage point increase in graduates versus a four percentage point increase in graduate jobs). This again holds occupational skill requirements as fixed.

**FIGURE 12:**  
Share of UK jobs by Green and Henseke-defined qualification requirements, 2022



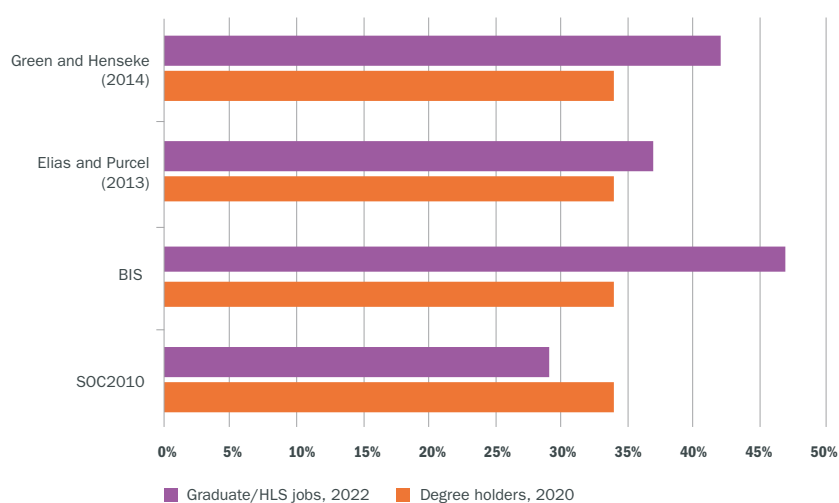
Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, Green and Henseke 2014

## 1.5 Summary

As we progress towards the 2020s, growth in occupations that require higher-level skills will continue; the proportion of jobs that require them will grow at the expense of those demanding low to mid-level qualifications. Despite recent headlines indicating an oversupply of graduates, when higher-level skills are viewed through the prism of qualifications, the current picture appears somewhat different: the various analyses suggest that on the whole, even allowing for statistical deficiencies and the nuances of categorisation, there is no great oversupply of higher-level qualifications and, in particular, graduate talent (see Figure 13).

*Even allowing for statistical deficiencies and the nuances of categorisation, there is no great oversupply of higher-level qualifications and, in particular, graduate talent.*

**FIGURE 13:**  
Graduate jobs by occupation-qualification framework<sup>13</sup>



Source: Author calculation from Bosworth and Leach 2015, Wilson et al 2014, SOC 2010, BIS 2015, Elias and Purcell 2013, Green and Henseke 2014

This is not to suggest that there are no ‘mismatched’ graduates. The 2013–14 Destinations of Leavers from Higher Education (DLHE) survey indicates that 28% of all employed UK-domiciled full-time graduates were in what HESA classified as non-professional employment<sup>14</sup>, while Green and Henseke (2014) find that approximately 30% of graduates in the UK are working in what they deem non-graduate jobs. The authors note, however, that despite a ten percentage point increase in the number of graduates in the labour market between 1997 and 2012, the proportion of mismatched graduates has remained stable throughout that time.

<sup>13</sup> Note that the jobs included under ‘BIS’ are deemed ‘high-skilled’ and not, under the BIS framework, exclusively classified as ‘graduate jobs’.

<sup>14</sup> Outside of SOC 2010 major categories 1–3

The causes of this mismatch are varied and, according to the analysis presented here, not purely a consequence of the supply and demand for qualifications. While some of these figures are, inevitably, linked to the methods for usefulness of defining graduate jobs, there is a need for further research into the causes of and solutions to such mismatches (see sections 2.3 and 3.3).

Despite mismatching, aggregate demand for graduate-level qualifications is projected to continue, even when analysed through a series of frameworks that treats occupational skill requirements as fixed. There is also evidence of strong, continued demand for higher – but not necessarily degree-level – qualifications. The SOC 2010 framework, which gradates skill requirements into four categories, does indicate a large (14–17 percentage points) undersupply of workers qualified to QCF 4 and 5, the equivalent of a BTEC, HNC, HND or Foundation degree (see Figures 3 and 4), and a slight oversupply (5 percentage points) of graduates in 2022. This seems to resonate with claims that employers are struggling to find strong applicants with higher-level, and often technical, skills.

On the one hand, we need to read these results with caution: section 1.1 noted the coarse assumptions made in quantifying skills levels and the blanket occupational characterisations applied here. On the other hand, the evidence, however qualified, that shows an unmet demand for higher-level qualifications should prompt further inquiry from within government, business and the higher education sector. Which specific higher qualifications are in demand, not just in an ordinal manner (eg QCF 4, 5 or 6) but also in a qualitative manner (eg what specific skills and domain knowledge are in demand)? In other words, there needs to be further examination of the skill requirements at a more granular level, alongside efforts to provide high-level, and ideally transferrable and flexible, skills that meet the shifting demands of a modern knowledge economy.

*There is evidence of strong, continued demand for higher – but not necessarily degree-level – qualifications.*

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*Unmet demand for higher-level qualifications should prompt further inquiry from within government, business and the higher education sector.*

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## 2. HIGHER-LEVEL SKILLS AS DEFINED BY CORE AND EMPLOYABILITY SKILLS

Evaluating the supply and demand for core and employability skills is far more complex than analysing any mismatches in the supply and demand for qualifications. Evidence on the supply of these skills within the UK labour force is limited in scope and not disaggregated to education level, while evidence on the demand for them is at best vague. Most surveys reveal employer demand for greater ‘practical’, ‘job specific’, ‘communication’ or ‘technical’ skills without providing clear examples or elaborating on how such skills can be acquired or provided.

This chapter first attempts to describe the supply of these skills among recent graduates by reviewing skills surveys and employer assessments, before going on to discuss the demand for such skills from employers by looking at the type and depth of skill shortage vacancies across the UK. It then highlights the specific types of core and employability skills that studies have found helpful both in reducing the odds of graduate mismatch and in driving workplace innovation, noting the potential for public policy responses where appropriate.

Although an imperfect definition, for clarity purposes, the term ‘core skills’ here refers to literacy, numeracy and IT, while ‘employability’ refers to a longer list including team working, analytical skills, problem solving, communication, entrepreneurship, leadership, etc.

### 2.1 Supply

The UK’s (England and Northern Ireland) recent performance in the OECD’s Survey of Adult Skills, which tests adults on literacy, numeracy and problem solving in an IT environment, are worrying: while all working age adults scored near or just below the OECD average on each measure, young adults (16–24) scored below the OECD average on every one.<sup>15</sup> However, the survey does not disaggregate between qualification levels, meaning it tells us little about the state of those with higher-level qualifications. The 2015 CBI/Pearson Education and Skills Survey does disaggregate by education level, finding that in the past year 12% of employers provided remedial numeracy training, 10% literacy/use of English remedial training and 10% remedial IT skills to recent graduates. Although this seems alarming, the figures for school/college leavers are 17%, 18% and 13% and for all adults are 14%, 11%

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<sup>15</sup> The mean literacy proficiency score for all working age adults in England/Ni is not significantly different from the OECD average. The mean literacy proficiency score for young adults (16–24) in England/Ni is significantly below the OECD average: 262 points versus 278. Mean numeracy scores are lower than the OECD average (266 points) for both all adults (259) and young adults (257). The proportion of working age adults with high problem solving skills in England/Ni is roughly similar to the OECD average: 5.6% versus 5.8%, respectively. However, when looking at young adults (16–24) the picture is somewhat less optimistic: 6.6% in England/Ni are classified at Level 3, against a 9% OECD average.

and 40%. This suggests that these issues may not top employers' list of concerns surrounding graduate-specific skills.

The 2013 UKCES Employer Skills Survey asked employers who have recently recruited young people to assess their workplace readiness: 83% of employers in England, Scotland, Northern Ireland and Wales reported their graduates to be 'very well prepared' or 'well prepared' compared to 66% for 17 to 18-year-old school leavers and 74% for further education leavers. Further questions asking the remaining 17% of employers, who indicated that their graduate recruits were poorly prepared, what skills were lacking provide little clarity: just 7% said their university leavers exhibited a 'lack of working world, life experience or maturity' (compared to 13% for college leavers and 22% for school leavers), 4% reported 'poor attitude, personality or lack of motivation' and 5% stated a 'lack of required skills or competencies'. Just 1% cited literacy, numeracy or educational attainment (see Table 1).

**TABLE 1:**

Missing skills by type of education leaver, UK, 2013

	LACK OF WORKING WORLD, LIFE EXPERIENCE OR MATURITY	POOR ATTITUDE, PERSONALITY OR LACK OF MOTIVATION	LACK OF REQUIRED SKILLS OR COMPETENCE	LACK OF COMMON SENSE	LITERACY/ NUMERACY SKILLS	POOR EDUCATIONAL ATTAINMENT
<b>SCHOOL LEAVERS</b>	22%	18%	10%	5%	4%	3%
<b>FE COLLEGE LEAVERS</b>	13%	10%	7%	3%	2%	1%
<b>UNIVERSITY/HE LEAVERS</b>	7%	4%	5%	2%	1%	1%

Source: Winterbotham et al, 2013

UKCES also asked employers who have not recruited education leavers their reason for doing so<sup>16</sup>; where employers said young applicants failed to meet the requirements, 63% answered that applicants 'lacked the necessary skills', 61% answered that they lacked the 'relevant work experience', and 24% said they were missing both. Unfortunately, the 'necessary skills' that graduates lacked are difficult to isolate and identify: do these include attributes that could only be picked up on the job or are they more general, such as workplace communication and organisation? The CBI/Pearson Education and Skills Survey asked employers more specific questions about graduate applicants' 'job-readiness', finding that 14% reported dissatisfaction with graduates' basic numeracy skills, 17% reported dissatisfaction with basic literacy and use of English, 19% reported dissatisfaction in their analysis skills, 21% problem-solving, 26% team working, 29% communication, 33% self-management and resilience, and 46% relevant work experience. However, it is not clear whether those surveyed had or had not hired a graduate.<sup>17</sup>

16 These questions were asked of employers who had received applications from young people but did not find them to meet their requirements; 61% of all employers who reported not recruiting a young person report not doing so because they received no applications from candidates under the age of 25.

17 For school/college the figures are basic numeracy: 37%; basic literacy/use of English: 37%; analysis: 47%; problem solving: 43%; team working: 31%; communication: 49%; self-management/resilience: 61%; relevant work experience: 55%.

Assessing the state of high qualified/graduate-level skills does, as to be expected, produce somewhat nebulous results. While young people across the UK score below the OECD average on core skills such as literacy, numeracy and problem solving, divergent findings from different employer surveys prevent us from understanding the extent to which this applies to graduates. However, there is consistency in that most surveys point to graduates’ lack of work experience and some combination of ‘necessary’ or job specific skills.

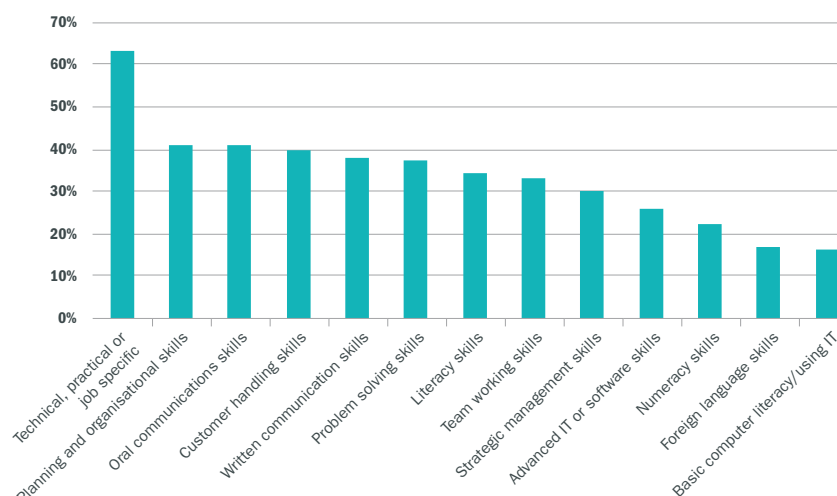
## 2.2 Demand

Evaluating demand, which is of course intertwined with supply, is similarly imprecise: the 2013 UKCES Employer Skills Survey found approximately 146,000 skill shortage vacancies (SSVs) – vacancies that are hard to fill due to a lack of skills in the applicant pool – in the UK, with 4% of employers reporting them. SSVs are particularly concentrated within smaller firms: UKCES notes that, ‘Approaching a third of all vacancies in establishments with fewer than five staff were hard-to-fill as a result of a lack of skills, qualifications or experience compared to 15 per cent in the largest establishments.’

These figures can be broken down by occupation and industry but not necessarily by education level or age. So for example, we don’t know if the particular SSVs that occur within managerial occupations in the construction sector are specific to entry-level or mid-career positions; as such it is difficult to try and link graduate skills supply with SSV-defined demand.

Figure 14 shows that 63% of SSVs are attributed to a lack of technical, practical or job-specific skills and 41% to both planning and organisational skills, and to oral communication skills.

**FIGURE 14:**  
Skill shortage vacancies by missing skill



Source: Winterbotham et al, 2013



Breaking down SSVs by skill and SOC major category illustrates the importance of technical, practical or job specific skills. These are the top attributed ‘missing’ skills for each type of occupation, with planning and organisation, strategic management and problem solving also taking top billing among the main occupations that graduates and high qualified workers find themselves in.<sup>18</sup>

**FIGURE 15:**

Missing skills by SOC major code



Source: Winterbotham et al, 2013

Attempting to link up what is lacking among graduates and high-qualified young people with what employers demand from workers of all ages is an exercise in frustration: on the one hand, young people are said to lack general employability skills and workplace experience, while on the other hand, the top cited reason for skill shortage vacancies across all occupations is ‘technical, practical or job-specific skills’.

Looking specifically at young recruits, what are the employability and workplace skills that employers find lacking? As noted above, the CBI found that between 14 and 29% of employers reported dissatisfaction with graduates’ literacy, numeracy, analysis, team working, communication, problem-solving and self-management skills. Eighty-nine per cent of employers surveyed by the CBI reported that such ‘attitudes and aptitudes’ for work were among the most important factors considered when hiring a graduate, followed by work experience (66%) and degree subject (55%).<sup>19</sup> In fact, the Brighton Fuse project found that a combination of skills is essential, a point that resonates with much of the academic research on graduate mismatches and overqualification. Chevalier and Lindley (2007) analysed differences between graduates working in what they deemed ‘graduate’ and ‘non-graduate’ jobs, and found little difference in academic skills

*On the one hand, young people are said to lack general employability skills and workplace experience, while on the other hand, the top cited reason for skill shortage vacancies across all occupations is ‘technical, practical or job-specific skills’.*

<sup>18</sup> Other top concerns included customer handling skills (40%, 27% and 55% for managers, professionals and associate professionals, respectively), written communication (31%, 25% and 40%) and team working (34%, 22% and 31%).

<sup>19</sup> Though, as noted, it is difficult to reconcile this with the UKCES finding that just 1% of organisations who had hired graduates were dissatisfied with their literacy and numeracy skills.

but ‘large differences’ in ‘entrepreneurial, management and leadership’ skills – where there was an association between lacking these skills and falling into a non-graduate job.<sup>20</sup> Green and McIntosh (2007) point to planning, problem-solving and communication skills. Of course, the list of skills placed under the ‘employability’ category will shift over time with innovation and technological change; for example, a recent Universities UK report highlighted cross-sectoral employer demand for a combination of data skills that allow workers not only to analyse and interpret data but also ‘to transform data outputs into something valuable to employers.’

## 2.3 Summary

So in the most simplified terms, the problem is twofold. First, how to provide a more generalised set of skills related to communications, strategy, entrepreneurship, data and analysis that will serve young people entering into any occupation and industry. And second, how to provide graduates with the technical or job-specific skills that surely vary between occupation and industry, let alone between firm. The answer to the first concern is seemingly well rehearsed: university-business collaboration to provide work experience and placements, internships and other forms of graduate training schemes, supported by strong and innovative careers advice. But while a focus within universities on employability-enhancing skills such as leadership, strategy and teamwork could of course be beneficial, the higher education sector has to take care that such an agenda is balanced against the provision of subject knowledge, analytical, critical and creative thinking skills that already serve graduates so well. This is particularly important when it is unclear that educators and employers interpret terms such as ‘employability,’ ‘strategy’ and ‘teamwork’ in the same way.

Collaboration between universities and business on careers advice and work experience should include a specific programme of work that is focused on skills translation: when employers call for better communication, organisational or indeed entrepreneurial skills, what, exactly, do they mean? Does the meaning of these terms vary between institutions, industries and different levels of management? Once employers and educators start to speak the same language, it will be easier for them to collaboratively develop careers programmes that address the critical disjuncture between them: which skills do businesses expect education leavers to have when they enter the world of work, and which are best picked up on the job, or indeed through in-work training?

*Once employers and educators start to speak the same language, it will be easier for them to collaboratively develop careers programmes that address the critical disjuncture between them.*

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<sup>20</sup> The authors draw a distinction between ‘matched graduates’, those who are in a non-graduate occupation but are ‘satisfied with their occupational match’ (‘apparently over-educated’) and those that are neither in a graduate job nor satisfied (‘genuinely over-educated’). It is genuinely over-educated graduates who, the authors find, are 15 percentage points less likely to have developed these skills at university, as compare to their matched and apparently over-educated counterparts.

The second concern, related to both graduates and indeed any applicant unable to fill an SSV, relates to ‘technical, practical, or job specific skills’. How can we ensure that new entrants to the labour market can work with businesses that require technical knowledge? While employers and educators could band together to update courses, offer internships and highlight graduate training schemes, we also need to consider higher-level and degree apprenticeships: to what extent will their development begin to alleviate SSVs and stave off skill gaps<sup>21</sup>, and how can we convince educators and businesses that their long-term commitment to the scheme will yield returns? The government’s commitment to higher-level and degree apprenticeships is a welcome step – we may see 20,000 new starts in 2014–15. As shown in Universities UK’s 2014 report with UKCES, *Forging Futures*, innovative university-business collaboration to deliver higher-level apprentices or provide bespoke higher education to meet industry needs can provide a skills pipeline, but also helps graduates develop the highly relevant practical skills which could take years to develop in the workplace, along with the theoretical underpinning that will remain relevant in the face of technological change.

*Innovative university-business collaboration to deliver higher-level apprentices can provide a skills pipeline.*

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<sup>21</sup> The term ‘skill gaps’ referring to vacancies within an employer’s existing workforce.

## 3. HIGHER-LEVEL SKILLS AS DEFINED BY SUBJECT KNOWLEDGE

It is not unheard of for commentators to assert that some subjects are ‘better’ or ‘tougher’ than others; the ‘wrong’ subjects, such as arts or humanities, the argument goes, offer comparatively few marketable skills and/or little labour market return. But to what extent does this narrative ignore variance in the depth and breadth of core and employability skills offered by different subjects, and to what extent does it reflect labour market demand for different types of subject knowledge?

Just as employers tend to split skill requirements into two broad categories – core or employability and specific or technical skills – the knowledge acquired through higher-level qualifications can also be roughly split into two categories. They offer different types of subject-specific knowledge while the process of building that subject knowledge often propels students to pick up different types of core and employability skills.

This chapter assesses the supply and demand for different subjects, considering both the domain knowledge and the types of core and employability skills typically associated with each. It first outlines the composition of study – according to subject – in UK higher education, before discussing the types of skills typically associated with each of these. It discusses, in very general terms, how these skills relate to employer demand as shown through surveys like those conducted by UKCES and the CBI. It then moves on to discuss the extent to which we can match the supply of domain or subject-specific knowledge with demand for such knowledge, as indicated by skill shortage vacancies and graduate destinations. It also considers subject-based variation in other proxies for demand, such as employment rates and pay. Where appropriate, it sets out areas for further investigation and policy responses.

### 3.1 Supply

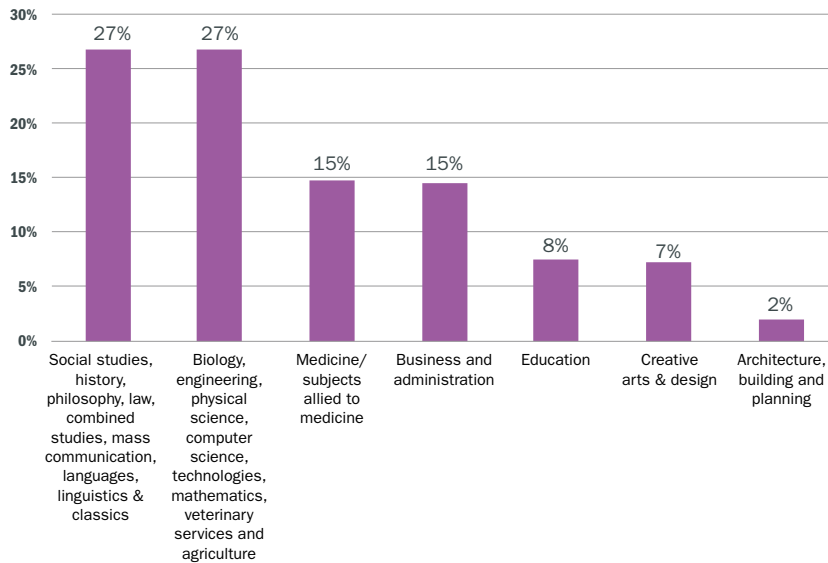
While we do not have data on the mix of subjects that the current labour force has studied, we can deploy figures from the Higher Education Statistics Agency (HESA) Student Record as an indicator of the future subject supply of those qualified to QCF4+.<sup>22</sup> During 2013–14, 27% of higher education students studied science and maths-related subjects; another 27% of students were on courses related to social studies, history, law, philosophy, etc; 15% studied medicine-related subjects and business and administration; 8% studied education; 7% were on courses classified under creative arts and design; and 2% architecture, building and planning.

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<sup>22</sup> This data is limited to students studying at higher education institutions.

**FIGURE 16:**

Higher education students by subject, 2013–14



Source: HESA Student Record 2013–14

A 2012 survey of third-year undergraduates asked students to self-rate their core skills. The results show little variance across certain skills, such as self-discipline and ability to work in a team and rather expected variance across others, like written communication (where history, philosophy, law and social sciences lead) and numeracy (where mathematics, computer science and engineering and technology lead).<sup>23</sup>

The survey also asked students to identify, on a scale of 1 to 5, employability skills that they specifically developed over their course. Where the average response for a subject is significantly above or below the sample mean, it is included in Table 2.

Here we see a little more subject-based variance in the sorts of skills students believe they have developed during their course.<sup>24</sup> While for example linguistics and classics students are more likely to report having developed critical analysis skills, maths and computer science students are among the least likely; the opposite occurs when asked about their problem-solving skills. Entrepreneurial skills were reportedly developed among a wide array of subjects: from creative arts to architecture and business, but not among history and philosophy or linguistics and classics. This suggests that while graduates of all subjects are entering the labour market with a wide variety of core and employability skills, the specific skills developed varies from course to course; there is no one subject group that believes they excel in every area.

*While graduates of all subjects are entering the labour market with a wide variety of core and employability skills, the specific skills developed varies from course to course.*

<sup>23</sup> Atfield and Purcell (2012)

<sup>24</sup> These findings should be read with some caution. For example, it is unclear whether maths and engineering students, who contain the largest number of below average scores, are more self-critical than others. Moreover, some students may not have indicated skills development in a particular area during their course because they believe that they were already developed in that area before they started their course.

**TABLE 2:**

Self-reported skill development by subject area

SKILL/COMPETENCE/CAPACITY	MORE LIKELY TO SAY THEY DEVELOPED THIS SKILL	LESS LIKELY TO SAY THEY DEVELOPED THIS SKILL
<b>RESEARCH SKILLS</b>	Linguistics & classics; historical & philosophical studies	Maths & computer science; engineering & technology
<b>SPECIALIST KNOWLEDGE</b>	Historical & philosophical studies	–
<b>CRITICAL ANALYSIS</b>	Linguistics & classics; historical & philosophical studies; law	Maths & computer science; engineering & technology
<b>ABILITY TO APPLY KNOWLEDGE</b>	Law	Mass communication & documentation
<b>WRITTEN COMMUNICATION</b>	Linguistics & classics	Maths & computer science; engineering & technology
<b>LOGICAL THINKING</b>	Law	Mass communication & documentation; creative arts
<b>PRESENTATION SKILLS</b>	Architecture, building, planning	Maths & computer science
<b>PROBLEM-SOLVING</b>	Law; maths & computer science; allied to medicine; physical sciences; architecture, building, planning	Linguistics & classics; mass communication & documentation; history & philosophical studies
<b>ENTREPRENEURIAL/ENTERPRISE SKILLS</b>	Business & admin; architecture, building, planning; engineering & technology; creative arts & design	History & philosophical studies; linguistics & classics

Source: Atfield and Purcell, 2012

### 3.2 Demand

As noted in Chapter 1, the CBI found that between 14 and 29% of employers reported dissatisfaction with graduates' literacy, numeracy, analysis, team working, communication, problem-solving and self-management skills. UKCES data on skill shortage vacancies (Figure 14) highlighted communication, planning and organisation, customer handling and problem solving.

How might the supply of subject-specific skills meet current labour market shortages, as indicated by SSVs? It is difficult to provide a confident answer given we do not know at what career stage these SSVs currently or will exist. However, looking at the current data we can infer that these trends will last at least until current higher education students enter the labour market.

We know that the largest absolute numbers of SSVs occur in professional occupations – those that typically require graduate-level qualifications. This is followed closely by caring and leisure and (another high-skilled category) associate professional and technical. In terms of density – the proportion of all vacancies that are skills-related – we see particular challenges for the aforementioned three categories but also for skilled trades occupations and managers.

**TABLE 3:**

SSV Size and density, by SOC 2010 major code, 2013

	2013 SSVS	% OF ALL SSVS	SSV DENSITY
PROFESSIONALS	28,800	20%	30%
CARING, LEISURE ET AL	27,000	19%	27%
ASSOCIATE PROFESSIONAL AND TECHNICAL	25,400	18%	26%
SKILLED TRADES	19,800	14%	39%
ELEMENTARY	10,700	7%	13%
SALES	10,100	7%	13%
ADMINISTRATIVE	8,900	6%	13%
PROCESS PLANT AND MACHINE OPS	7,400	5%	25%
MANAGERS	4,700	3%	20%

But to what extent does subject choice mediate graduates' potential to fill these SSVs? When looking at SSV density by both occupation and sector, we see that the relative impact of SSVs is quite large in professional occupations within manual sectors (for example, professional occupations in the manufacturing and electricity, gas and water sectors), but that skilled trade occupations within service industries are also facing quite significant relative shortages (for example in business services, and hotels and restaurants).<sup>25</sup>

**TABLE 4:**

SSV density by SOC major code and industry

	MANAGERS	PROFESSIONALS	ASSOCIATE PROFESSIONALS	ADMINISTRATIVE AND CLERICAL	SKILLED TRADES
CONSTRUCTION	31%	16%	19%	11%	29%
MANUFACTURING	26%	55%	28%	14%	41%
BUSINESS SERVICES	25%	37%	34%	23%	49%
HOTELS AND RESTAURANTS	25%		15%	19%	44%
WHOLESALE AND RETAIL	22%	16%	3%	15%	45%
HEALTH AND SOCIAL WORK	16%	32%	10%	7%	20%
COMMUNITY, SOCIAL AND PERSONAL SERVICE ACTIVITIES	15%	20%	23%	11%	20%
EDUCATION	14%	13%	15%	6%	27%
TRANSPORT AND COMMUNICATIONS	12%	34%	27%	12%	35%
FINANCIAL SERVICES	6%	12%	15%	8%	
ELECTRICITY, GAS AND WATER	0%	49%	41%	9%	24%
PUBLIC ADMINISTRATION	0%	30%	13%	5%	
AGRICULTURE	0%				37%
MINING AND QUARRYING	0%				

Source: Winterbotham et al, 2013

<sup>25</sup> Due to low base sizes in the number of SSVs by occupation and industry combined, these figures should be read with an element of caution.

The extent to which these shortages solely result from an undersupply of graduates who studied the ‘appropriate’ subjects is in doubt: we know that as many as 27% (617,884) of current higher education students are in subjects that could be loosely defined as ‘STEM’ (science, technology, engineering and mathematics) and that many STEM graduates go on to work in other sectors, such as financial services.

*The extent to which shortages solely result from an undersupply of graduates who studied the ‘appropriate’ subjects is in doubt.*

However, it is difficult to get a firm grasp on where graduates from different subjects go on to work. The longitudinal DLHE displays the industries in which graduates (of all levels), by subject area, are working 40 months after leaving university. However, interpreting industry level-data is not clear cut: a graduate’s ‘destination’ is classified by the industry of their employer not by their specific role within that employer; so for example an IT worker in a financial services company would be classified as working in financial services. With that caveat, Table 5 below displays destinations of all graduates who studied subjects associated with high SSV density. The data indicates that less than half of the computer science graduates who left university in 2010–11 were working in the IT industry three years after leaving university, with 11% working in finance and insurance; 12% in professional, scientific and technical (a wide category that includes legal and accounting, management and consultancy, architecture, scientific R&D, advertising and market research, veterinary activities); and 14% in education. As far as the data tells us, just 29% of physical science graduates work in professional, scientific and technical activities; almost half of architecture graduates work outside of the architectural sector,<sup>26</sup> despite it having a high density of managerial-level SSVs.

**TABLE 5:**  
Graduate employment destination by subject studied

	PHYSICAL SCIENCES	MATHEMATICAL SCIENCES	COMPUTER SCIENCE	ENGINEERING & TECHNOLOGY	ARCHITECTURE, BUILDING & PLANNING
PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	25.2%	21.9%	9.6%	26.5%	46.5%
EDUCATION	17.5%	20.5%	8.6%	5.2%	3.7%
MANUFACTURING	8.7%	4.6%	6.8%	23.7%	2.5%
PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	7.5%	4.0%	3.1%	4.0%	6.0%
HUMAN HEALTH AND SOCIAL WORK ACTIVITIES	6.5%	2.2%	2.9%	1.6%	3.2%
WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	5.3%	4.9%	8.7%	5.6%	2.9%
INFORMATION AND COMMUNICATION	5.0%	10.9%	38.4%	8.4%	1.5%
FINANCIAL AND INSURANCE ACTIVITIES	4.8%	23.4%	8.5%	3.1%	2.4%
ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	2.8%	1.9%	3.8%	1.3%	2.6%
CONSTRUCTION	2.0%	0.3%	1.2%	5.8%	14.9%
REAL ESTATE ACTIVITIES	1.5%	0.4%	0.6%	0.3%	8.1%

Source: HESA Destinations of Leavers from Higher Education Longitudinal Survey 2010–11

26 This is included under ‘professional, scientific and technical activities’.



Of course we should continue to encourage students to take on STEM subjects. However, these figures should prompt employers and educators to explore why, as far as the data can tell us, fewer graduates than might be expected are going on to work in these technical roles.

Other market signals such as employment levels may be used as rough proxy for the demand of subject-specific skills. While 73% of 2010–11 graduates<sup>27</sup> were in full-time employment by November 2014 (and 20% in part-time work and/or further study), employment rates ranged between subject and even within subject groups: from 63%<sup>28</sup> (history and philosophy, and biological sciences) to 82% (engineering). Forty per cent of medicine and dentistry graduates were making between £40,000 and £49,000 three years after graduation, as compared to the 41% of creative arts and design who were making anywhere up to £20,000 (these figures do not take account of regional differences). Despite variation in wages, it is worth placing these figures in context: 44% of creative arts and design graduates and 48% of social science graduates were earning between £20,000 and £29,000 just three years after leaving their studies; a quarter of social studies graduates were earning between £30,000 and £39,000. However, the median salary for young non-graduates (age 21–30) is £18,000; for all working-age non-graduates (age 16–64) it is £22,000.

### 3.3 Summary

The evidence outlined here suggests that most students believe their courses have helped them to develop a set of employability skills that will serve them well throughout their careers, however the specific skills that they developed vary from subject to subject. The evidence also indicates that labour market demand for graduates of all subjects, as measured by employment and pay, is quite strong; while certain subjects undoubtedly offer greater pay than others, this variation cannot directly indicate the value (monetary or not) of a certain subject-based skillset, or indeed its contribution to the economy. Despite the fact that creative arts graduates earn, on average, lower pay within three years of leaving university than many of their counterparts, their contribution to the economy should not be discounted: the CBI recently stated that creative industries comprise between 6 and 8% of the nation's output and directly employ over one million people.<sup>29</sup>

*The evidence indicates that labour market demand for graduates of all subjects, as measured by employment and pay, is quite strong.*

However, salary differences between subjects do underscore the need for schools to provide a careers service that balances interest, ambition and indeed clear, transparent labour market information while

<sup>27</sup> From undergraduate and postgraduate courses.

<sup>28</sup> Combined studies has a full-time employment rate of 52% but is excluded here because 20% of graduates in this subject are classified as 'not available for employment' – compared to a 2.2% average.

<sup>29</sup> CBI (2011)

recognising that occupations' tasks and skill requirements evolve – sometimes in less than a decade.

UKCES has placed its labour market data into a data portal – LMI For All – and encourages users to 'bring the data to life' by developing applications and websites. This data tells users which occupations – at the very detailed four-digit unit code – will see the greatest jobs growth and how much they can expect it to pay. How can both educators and business ensure young people are engaged with this? How can we ensure that sense can be made of the data in a meaningful way to advise and guide students on their choices and the consequences?

When looking at demand for subjects as measured by skill shortage vacancies, the picture is somewhat murkier. On the one hand we know there is strong and unmet demand for managers, professionals and associate professionals in industries that could be classified as service based (business services) and technical (construction and manufacturing). But on the other, the data indicates that a sizeable proportion of STEM-related graduates do go on to work in non-technical industries.

Initiatives to boost the number of STEM students are welcome; we also need to better understand the extent to which STEM graduates are choosing to eschew technical industries, where they are going instead, and why. This points to the need for further destinations research, perhaps at more granular level. And in the wake of such research, there needs to be greater collaboration between business, government and educators to address the issue and ensure that graduate talent can find the right opportunities, and vice versa. For example, UKCES data tells us that SSVs are particularly concentrated within smaller employers – the very employers with the least administrative and financial capacity to develop and invest in work placement opportunities, apprenticeships or graduate schemes. Finding a way for smaller firms to pool their financial and administrative burdens to develop work placement and traineeship programmes might help, as would schemes that simplify the administration and reduce the risk involved in taking on higher and degree level apprentices.

The diversity of subjects on offer is one of the things that makes UK higher education so attractive to students both within the UK and around the world. Proclamations that some subjects should be reduced or eschewed altogether is at odds with evidence showing that a diverse set of skills and domain knowledge is needed in the labour market. Government, educators and employers should work together both to ensure that there is a baseline level of core and employability skills on offer across all subjects and institutions, and to understand where blockages in the country's various talent pipelines may lie.

*Proclamations that some subjects should be reduced or eschewed altogether is at odds with evidence showing that a diverse set of skills and domain knowledge is needed in the labour market.*

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## 4. CONCLUSION

This analysis of supply and demand has shown that the demand for higher-qualified workers largely outstrips demand for low and mid-level qualifications. While there is indeed a strong – and unmet – demand for higher-level sub-degree skills, such as at BTEC or HND level, this does not mean there is a need to reduce the numbers earning a bachelor’s degree or above. Alongside the economic and technological changes of the past decade, we have seen not only a large increase in the proportion of graduate jobs – one that is projected to continue – but also upskilling within specific occupations, where higher-level qualifications become increasingly necessary. Graduate talent seems to spur upskilling, and thus demand for more graduate talent.

The analysis of specific skills and subject variation is anything but specific: most employer surveys indicate a demand for technical and job-specific skills while also demanding a wide array of general employability skills, such as communication, teamwork and commercial awareness, with entrepreneurial and data analysis skills increasingly being added to that to list. Work experience is seen as vital for students of all subjects, highlighting what students often perceive to be a ‘Catch 22’: you can’t get a job if you haven’t had a job. Graduates pick up an array of subject-specific, core and employability skills throughout their courses, though the specific skills they feel they have developed the most vary from course to course, with no one subject coming out on top.

Subject-based analysis also indicates that current labour market shortages are unlikely to be solely a result of low supply. Over one-quarter of current higher education students are on STEM-related courses; destinations data indicates that many of these graduates go on to work in non-STEM sectors. Destinations data also shows that graduates of all subjects are in demand; despite variation in pay, longitudinal DLHE data indicates that the median salary of graduates from the lowest paid subjects is still significantly higher than the median young non-graduate’s salary.

*Graduate talent seems to spur upskilling, and thus demand for more graduate talent.*

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## Recommendations

So, where next?

1. In this report, three out of four models predict an undersupply of graduates to meet the demand for graduate jobs, although none of these models take into account the potential upskilling that occurs in occupations over time. While the report does point to research indicating that there is a lower proportion of ‘mismatched’ graduates (ie graduates in non-graduate jobs) than recently reported in the press, the notion that any graduates are mismatched should prompt action from the higher education sector. **There needs to be a better understanding of why certain graduates become mismatched; which core, employability or subject-specific skills can prevent this from happening; and where students can best develop these skills.**
2. In particular, universities and employers need to talk about employability skills: terms such as ‘entrepreneurial skills’, ‘problem-solving’, and ‘team working’ may be interpreted differently across education providers, industries and occupations. As such, **employers, educators and students should collaboratively develop a ‘skills translation’ exercise to help them understand how these ‘soft skill’ principles can be practically developed and applied, and by extension, discover which of these are best acquired through extracurricular activities, in the classroom or through work experience.**
3. This report also shows that the UK labour market will require more graduates by 2022, alongside demand for a greater number of workers with higher – but not necessarily degree-level – qualifications, many of which will be required in occupations traditionally classified as ‘white collar’ (eg business and public service) and many in more technical occupations (eg skilled construction, metals and electronics). However, it also indicates that many occupations’ skill requirements will rise over time. This points to a need for greater collaboration between further and higher education. **Young people should have the opportunity to develop higher-level skills through a system of integrated pathways between the two forms of provision, one that provides a theoretical underpinning to technical knowledge and offers the chance for upskilling in line with economic, operational and technological change.**
4. To target such policy interventions, **the sector needs both a clearer and a more granular understanding of the size and content of provision across both further and higher education:** what subjects are being offered where, in what modes, and to what extent do these courses dovetail with skills gaps? Universities UK is beginning a research project that will aim to develop evidence on just that. It will discuss the extent to which some areas of provision will need to grow more than

others, whether more flexible pathways should be offered, and the extent to which new kinds of provision and modes of delivery are fit for purpose.

5. This report also finds that, in spite of a strong supply of STEM students, there are continued shortages of highly-qualified workers in technical industries. **Identifying – and fixing – this obstruction in the talent pipeline is crucial.** It is likely that degree apprenticeships will prove a crucial step in mending this; further research, such as that being conducted by Universities UK, should tell us how much of an impact they will have in reducing such shortages and aligning STEM graduates with STEM jobs.
6. Finally, we cannot ignore what goes on inside business: **there should be a heightened focus on skills utilisation.** What sort of management and business practices best utilise higher-level skills and how can similar practices be adopted by firms of diverse sizes and sectors? The UK's higher-level skills base is an immense national asset. The question is how best to utilise it.

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Universities UK takes sole responsibility for the findings and assertions put forth in this report.

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