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## Working Paper 5

# Classifying graduate occupations for the knowledge society

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## Classifying graduate occupations for the knowledge society

### Abstract

This paper updates earlier work by the authors (Elias and Purcell 2004) to create a statistical classification for analysis of the relationship between higher education (HE) and employment. Based on the Standard Classification of Occupations (SOC 2010), occupation unit groups are allocated to four categories via analysis of the tasks associated with typical jobs in each unit group. For three of the four categories (Experts, Orchestrators and Communicators) we postulate a link between the constituent tasks and the skills/knowledge provided via higher education. Validation of the new aggregate classification [SOC(HE) 2010] is then undertaken, using information from the 2011 and 2012 UK *Labour Force Surveys* and *Futuretrack* – a longitudinal study of applicants to HE in 2006.

### Background

As part of continuing research on the changing occupational structure of the UK labour market and its links with the evolving demand for the skills and knowledge provided via the higher education sector, we developed a simple statistical method whereby detailed information on occupational structure could be reclassified into a set of ‘graduate’ occupational categories (Elias and Purcell 2004). The methodology underlying the allocation of occupation unit group to these graduate categories relied heavily upon analysis of *Labour Force Survey* data, together with detailed occupational information collected as part of the work undertaken to construct the 1990 and 2000 versions of the Standard Occupational Classification<sup>1</sup>.

The resulting aggregate classification, termed SOC(HE), has been widely used by both analysts and policy makers (*e.g.* HEFCE 2011, UUK 2010, Furlong and Cartmel 2009: 88-92, Raffery and Dale 2008). Despite this interest, we have become increasingly concerned that, as graduates continue to enter the UK labour market in ever higher numbers, the method used previously to allocate occupation unit groups of the Standard Occupational Classification to graduate categories would no longer be tenable<sup>2</sup>. We have recent evidence of graduate ‘crowding’ into a variety of jobs and in sectors where it would appear unlikely that the constituent tasks demand the skills and knowledge associated with higher education (Elias and Purcell 2011), which reinforces findings from a recent study that had reached some similar conclusions

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<sup>1</sup> See Thomas and Elias (1989) and Elias *et al.* (2000).

<sup>2</sup> See James *et al.* (2011).

from comparative research using different methods (Green and Zhu 2012). This suggested that a new approach was required which would take advantage of the recent revision of the Standard Occupational Classifications (SOC) to the 2010 version<sup>3</sup> and its implementation in the Labour Force Survey and Futuretrack – a cohort study of 2005/06 applicants to full-time HE.

### **The conceptual basis of SOC(HE) 2010**

In revising the classification we have attempted to develop it using a potentially more transferable analytical method based upon the relationship between higher education, knowledge development and its labour market application. It was clear from work with Brazilian and Indian colleagues that such an approach might also be more useful for comparative research on the relationship between HE expansion and occupational change (Cardoso 2012, Unni and Sarkar 2011, Comin *et al* 2010, Basant and Mukhopadhyay 2009). We started with consideration of the nature of jobs; how jobs are constructed and the knowledge, skills and responsibilities that they encapsulate. In doing this, we went back to a research instrument developed with Nick Wilton to analyse the different kinds of capabilities required in the course of graduate employment (Purcell *et al.* 2004).

In 2002 we interviewed 220 UK graduates who had obtained a first degree in 1995. In the interviews, which were a series of semi-structured open-ended questions, we probed in detail about the substance of respondents' current jobs; the tasks they carried out, the responsibilities they had, the functions they fulfilled, their relationships with colleagues, managers and others involved in their work, and the knowledge and skills required to carry out their jobs effectively. We identified three distinct 'clusters of competence' that encompassed the core characteristics of *expertise*, *strategic skills* and *interactive skills* (ibid: pp.7ff). We then assessed the extent to which each graduate was required to possess and exercise any or all of these competences, and related them to SOC(HE) categories, finding systematic patterns.

Reconsidering these in the context of policy debates about 'graduate employability skills' and in the light of subsequent graduate labour market research (*e.g.* Elias and Purcell 2011, Brown *et al.* 2011, Atfield and Purcell 2010, UUK 2010), we reflected that it is imperative to put 'the knowledge society' under the microscope by looking at the jobs that graduates do and the knowledge required to do them. More specifically, we now want to explore how, and how far, knowledge and high level skills normally inculcated and developed in tertiary-level education are likely to be

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<sup>3</sup> See Elias and Birch (2010).

required in the jobs to which graduates have been appointed, especially those where it appears that the employer has paid a premium to employ graduates.

We considered it appropriate to reposition the inculcation of *knowledge*, rather than the development of ‘employability skills’, as the prime function of higher education; knowledge defined as theoretical or practical understanding and possession of information, normally acquired through an extended period of study; *knowledge about* something. We recognise that, as the physical and conceptual levels of investigation and creativity expand, new areas of knowledge are developed. We also recognise that knowledge is wide-ranging, dynamic and iterative rather than a static ‘commodity’, with varying degrees of complexity. At the most elementary level, the acquisition of any knowledge requires a foundation of what Sen (1999, 1985) and Nussbaum (2000) called ‘capabilities’, from the basic abilities to communicate, interpret and engage with others and with the material world in appropriate ways, in order to acquire knowledge. Different HE institutions and courses are concerned with knowledge and skills in different ratios to one another, and at different levels of complexity, requiring greater or less prior knowledge and abilities: a point that sometimes gets lost in debates about ‘employability’<sup>4</sup>. Nevertheless, we see what are often classified as ‘employability skills’ as the most basic levels of capabilities; prerequisites for, but not themselves constituting knowledge or skills at a level of complexity that requires or constitutes appropriate material for tertiary education curricula.

It is salutary to remember that the concept of ‘employability skills’ was developed in relation to providing basic practical skills to educationally-challenged young people so that they could obtain and retain employment that required them carry out simple tasks (Corbett and Ainley 1994) and that many of the ‘skills’ sought by employers might more appropriately be classified as behavioural habits or responses (Keep and Payne 2004). Higher education certainly entails the use and development of *skills* – encompassing both the development of high level and basic skills, understood as proficiency, facility or dexterity that is acquired or developed through training or experience. In HE these higher-level skills are generally related to the creation, evaluation, use and communication of knowledge: problem-solving, critical assessment of evidence, logical thinking, theoretical development and creativity. However, we hope that as a result of our analyses it will be possible to distinguish more effectively than hitherto the relevance to employment of the separate (and sometimes combined) aspects of ‘knowledge and skills’ or, to put it another way, the education and training outcomes that graduates bring to the labour market from higher education.

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<sup>4</sup> There have been considerable, often controversial, debates about this. See, in particular, Menand (2011) and Lauder and Brown (2011), for recent stimulating contributions.

Brown *et al.* (2011: 80-81) in a somewhat more pessimistic analysis of recent and evolving labour market change, classify 'knowledge workers' into three categories:

'Developers...[who] represent no more than 10-15 per cent of an organisation's workforce and include senior researchers, managers, and professionals...

Demonstrators...assigned to implement or execute existing knowledge, procedures or management techniques, often with the aid of software. Much of the knowledge used by consultants, managers, teachers, nurses, technicians...is standardised or pre-packaged...so [although the occupations] may include highly qualified people, much of the focus is on effective communication with colleagues and customers.

Drones are involved in monotonous work, and they are not expected to engage their brains. Many call centre or data entry jobs are classic examples....increasingly filled with highly-qualified workers either attracted by relatively high salaries in emerging economies or those in developed economies who are over-qualified but struggling to find a job that matches their training or expectations.'

Brown and his colleagues are concerned, as we are, to assess employees' relation to knowledge development and use, but their somewhat *Brave New World* scenario is more theory-led than empirically grounded, and they conflate 'autonomy', 'thinking' and 'using knowledge', which are not inherently synonymous except at the most basic conceptual level. Their focus is on the relationship between HE credentials and access to employment, rather than on the knowledge and skills developed in HE and subsequent access to employment. In their discussion of the changing relationship between HE and the global labour market, Lauder and Brown (2011) restrict their consideration of the market for graduates in the global economy to 'the market for talent' as defined by transnational companies (TNCs), and discuss 'professional and managerial occupations' and 'knowledge work' as if synonymous. This perspective reflects their meticulous and illuminating research on transnational organisations across seven countries but, in terms of the graduate labour market as a whole, underestimates the significance of graduates employed in public sector employment and in many vocational occupations, which also recruit graduates for jobs in which they not only have 'permission to think' but are required to have knowledge and high level skills that enable them to do so, often innovatively. These employers, although an important component of the global economy, may be nationally-bounded and recruit on criteria other than potential to promote global competitiveness.

We take as our starting point Young's (2009, 2012) contention that the purpose of universities is the transmission of knowledge and the creation of new knowledge<sup>5</sup>, and that it is important to distinguish between knowledge and experience. We also bear in mind Hochschild's (1986) insight that nearly all jobs, however complex or simple, involve elements of three distinct kinds of work effort: mental, manual and emotional labour. We conclude that in order to qualify as an appropriate job for someone who has spent three years or more in tertiary education, occupations need to have a substantial inherent 'mental labour' requirement in order to be able to carry out the duties entailed. We also recognise that although particular 'packages of knowledge' are in some sense commodities, 'possessed' by individuals and organisations, 'knowledge' is essentially conceptual and dynamic rather than absolute. Employees are recruited because they have capacities to utilise, build on, revise and update specific areas of knowledge. The degree to which they utilise and can develop further their knowledge and skills depends upon the requirements of their job. In the same way that not all knowledge workers work for, or aspire to work for TNCs, not all knowledge workers are, or are recruited by their employers to be creative or innovative. The market for knowledge workers is broad. This is an important point. Employers may use qualifications as a signal of ability or potential to do a job well, or as a threshold level of educational achievement in order to reduce the eligible field for an oversubscribed vacancy, but the classification we have developed is designed to assess the *direct* relationship between the knowledge and skills acquired in HE and the knowledge and skills used in the workplace.

## **Methodology**

In order to proceed with our investigation of the relationship between HE participation and employment outcomes, we began with the detailed descriptions of occupations listed in Volume 1 of SOC2010 (Office for National Statistics 2010) containing the structure and descriptions of unit groups. We considered each occupation at the four-digit level (unit groups), in terms of the educational and vocational requirements and range of tasks and responsibilities encompassed by the jobs included within each unit group, and conducted an analogous exercise to that we had carried out on the occupational information supplied by the 220 respondents to our 2002 study. We considered other broad categories of occupations, related to knowledge, skillsets and modes of delivery, but we concluded that the original three of 'knowledge', 'strategic skills' and 'interactive skills' that had been identified in the interview data provided a more robust analytic tool. These are revised as *specialist*

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<sup>5</sup> There are many ways of acquiring knowledge, as well as skills, and much of the knowledge that has had greatest impact on scientific as well as social and economic development has been generated outside academia, but a core function of HE throughout its history has been the development, revision, conservation and transmission of knowledge.

*expertise deriving from HE knowledge, the orchestration of knowledge and the communication of knowledge, defined as follows:*

- *Specialist expertise*; based on detailed knowledge and/or skills for which the normal foundation is an undergraduate degree course and where these are continually being exercised, developed and/or refined in practical and/or theoretical terms.
- *Orchestration expertise*; high-level competence based on knowledge and skills that may have been developed either in HE or through experience (and most often, both of these). It incorporates the ability to draw together knowledge and knowledge-holders, to direct and co-ordinate activities, assess alternatives, evaluate risks and influence or make high-level decisions on the basis of available evidence.
- *Communication expertise*; knowledge and skills, normally involving well-developed interactive skills, concerned with the exercise of high-level competence in the communication and dissemination of knowledge, ideas and information, between individuals, within groups, or for mass-production or consumption, delivered in person or using digital media.

These main categories of knowledge and skills can be sub-divided in different ways: for example, *specialist expertise* in terms of a range of narrow or broader areas of disciplinary or substantive knowledge or *types* of expertise, and *communication expertise* by mode of operation; written, oral, visual or technological communication; but we argue that the categories make sense as distinct categories in their entirety. We scored each four-digit SOC2010 unit group on a scale of 1-9 on each of these three dimensions, according to the extent that it required and entailed exercise of these abilities. As with the previous version of SOC(HE), we find that many knowledge-intensive occupations require hybrid knowledge and skills. In such cases we have aligned the unit group with the skill set which, in our view, is the most important to jobs within that unit group.

These are the occupational categories that comprise 'graduate occupations' in SOC(HE) 2010.

- *Experts*: Those in knowledge-intensive occupations that require them to draw on and use their specialist HE knowledge and skills in the course of their daily work, and whose appointment to their jobs and capacity to carry out the tasks and responsibilities required is directly related to possession of their specialist knowledge and/or high level skills. Examples include Chemical Scientists, Civil Engineers, Pharmacists, Solicitors, Physiotherapists, Chartered Surveyors, and Airline Pilots.
- *Orchestrators* are in jobs that require them to draw on and orchestrate their knowledge and the knowledge of others to evaluate information, assess options, plan, make decisions and co-ordinate the contributions of others to achieve objectives. The list of these is dominated by managers and directors but includes senior officers in the armed services, the police force and other public sector areas. As we have defined this group, it is unlikely that many recent graduates will be found in it, since it normally requires extensive experience in the fields of activity in question.
- *Communicators* require interactive skills that may be based on interpersonal skills, creative skills or high-level technological knowledge, capacity to access and manipulate information and/or an understanding of how to communicate information effectively to achieve objectives. Examples include Journalists, Actors, Conference and Exhibition Organisers, Web-design and Development Professionals and Marketing Associate Professionals.

These categories encapsulate Brown *et al.* (*op. cit.*) *developers* and *demonstrators*, but provide a more nuanced distinction among the categories of jobs that require HE qualifications and are based on *use* of HE-developed knowledge rather than assuming either that knowledge is synonymous with qualifications or that professional autonomy is synonymous with knowledge use. All the occupations included require the incumbents to exercise well-informed choice and creativity in the selection or deployment of alternatives, distinguishing such occupations from those that are essentially Digital Taylorism, where the operator has been trained to apply selection rules that do not require the exercise of significant judgment or problem-solving on the basis of more fundamental knowledge.

Appendix Table 1 shows the scores in the range 1-9 allocated to each unit group of SOC2010 for HE knowledge expertise, HE knowledge orchestration and HE knowledge communication. Points are allocated by identifying the most frequently

occurring job titles (posts) within each unit group of the SOC 2010 classification giving due consideration to the importance of specific tasks or sets of tasks that are typically associated with these posts. No reference is made to the age, gender or educational qualifications of typical post-holders. Scoring is done via a qualitative assessment of the extent to which these three attributes of knowledge that are most often, but in some areas of knowledge, not exclusively developed in higher education or equivalent advanced study, are requirements of the job. We have established a minimum score of 6 on each of these dimensions as indicative of a level of knowledge and skills competence that is always or nearly always developed within the higher education system. For example, SOC2010 unit group 1190 'Managers and directors in retail and wholesale' scores 5 for both knowledge expertise and knowledge communication. These aspects of the job are reasonably high, but are not necessarily acquired via a route through higher education. However, the demand for knowledge orchestration in terms of planning, organising or selecting from strategic alternatives are of a level often delivered and/or developed via higher education<sup>6</sup>.

Conversely, SOC2010 unit groups 3442 'Sports coaches, instructors and officials' and 3454 'Estate agents and auctioneers' do not score above 5 on any of these three aspects of knowledge transmission. While many holders of such jobs may be graduates, the tasks associated with post holders in these jobs do not normally require knowledge and skills developed on a three-year university degree to enable them to perform the associated tasks competently. The occupation of estate agent is an excellent example of this. Recent research has found that social class background, experience of private education and social skills were sought by employers and considered appropriate prerequisites to the job rather than HE qualifications or knowledge, suggesting that the increase in graduates entering this occupation reflects change in the labour supply rather than demand for higher levels of knowledge, skills or competence (James *et al.* 2012, ONS 2012).

We recognise that it is not possible to provide a universal definition of what constitutes a graduate job as a general taxonomic category, but we do consider that it is feasible to identify and evaluate the extent of expertise and the other two key variables we are using. Not all expertise is acquired or learned in HE or indeed, in a classroom or laboratory context or as part of education or training – but we can identify which areas of knowledge and skills are so acquired, and how and where the balance between pedagogic learning and experiential learning has been changing over time. Historical evidence reveals that HE, since the earliest universities were founded, has been vocational, related to learning for specific social roles and

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<sup>6</sup> It is important to remember here that the purpose of the SOC(HE) 2010 is to facilitate analysis of the transition between HE participation and labour market integration.

occupations, one of which was scholar<sup>7</sup>. Many of the occupations assumed in living memory to be unquestionably graduate occupations were originally learned through apprenticeships. The origins of the Royal Society of Surgeons<sup>8</sup> provides a particularly vivid example of this in the UK and the development of 'barefoot doctors' in China during the first half of the 20th century (Chen 1989) illustrates the way in which an occupation, the qualifications require to practice it and the scope of its professional corpus of knowledge is essentially socially constructed. The key questions that we wish to address in developing SOC(HE) 2010 are the socio-economic variables (including educational, organisational, technological and labour market changes) through which the relationships among education, qualifications and access to opportunities are negotiated and mediated. We have explained how we identified and conceptualised the three key clusters of elements to develop the classification, and we now proceed to test their robustness further.

### **Validating the classification**

Application of SOC(HE) 2010 requires that the occupational information to be aggregated has been coded to SOC2010. Two sources of information are available to us with this classification: the UK *Labour Force Survey 2011-2012* and *Futuretrack Wave 4*, a cohort study of applicants to HE in 2006.

#### *UK Labour Force Survey and SOC(HE) 2010*

Seven quarters of information from the Labour Force Survey (January-March 2011 to July-September 2012) are available with occupational information coded to SOC 2010. Survey respondents were selected from these seven quarters on the basis that they only appear once in a dataset formed by merging the seven quarterly surveys<sup>9</sup>, are over 22 years and have a valid occupation code for their current occupation. This yielded 97,535 cases.

Figure 1 shows the distribution of the four 'knowledge/skill' categories across the UK labour market. Non-graduate occupations make up just under 60 per cent of all full-time jobs, with men having a slightly larger share of non-graduate jobs than women. Jobs, which score highly in terms of expertise, constitute just under one fifth of all full-time employment, with a higher proportion of women occupying such jobs than men. The two other categories 'orchestrators' and 'communicators' make up 12 per cent and 7 per cent respectively, with a higher proportion of men in the former category and of women in the latter.

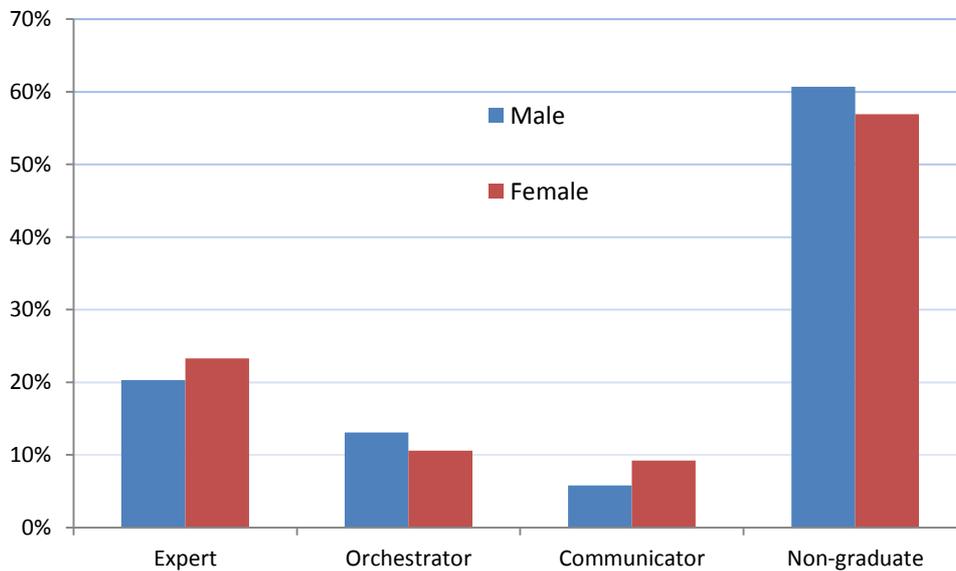
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<sup>7</sup> Discussed by Gouldner (1979) as producers, wholesalers and retailers of knowledge.

<sup>8</sup> See <http://www.rcseng.ac.uk/museums/archives/whats-in-the-archives>

<sup>9</sup> The LFS has a five quarter rotating sample design. Many respondents will report the same occupation at each successive interview. For this reason only the occupation reported at the first interview is selected.

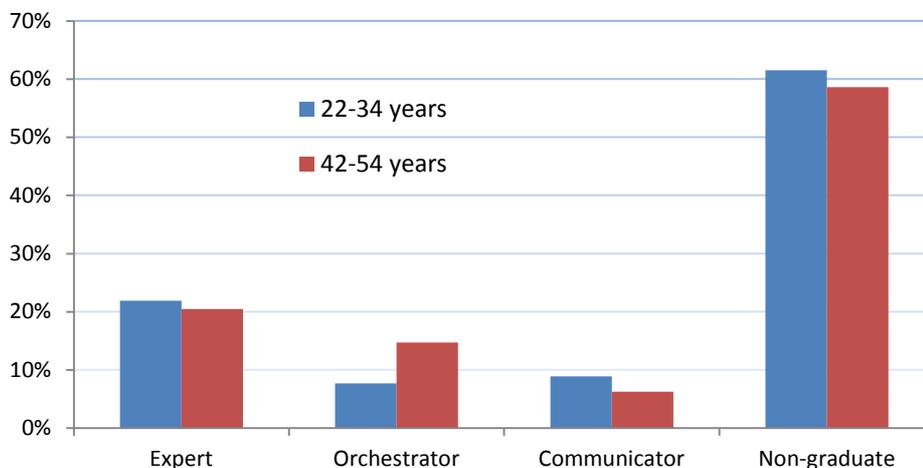
**Figure 1: Occupation of current job (SOC[HE]) by gender**



Source: UK Labour Force Surveys, January 2011 – September 2012.

Figure 2 presents this same information for two age groups. Compared with older respondents (42-54 years), younger respondents (22-34 years) have a slightly larger share of all of these categories apart from orchestrators. This probably reflects the fact that experience and seniority are likely to be required to equip job-holders for their role in these occupations, which require a significant degree of knowledge orchestration and this, rather than change in the nature of these jobs, accounts for the age difference.

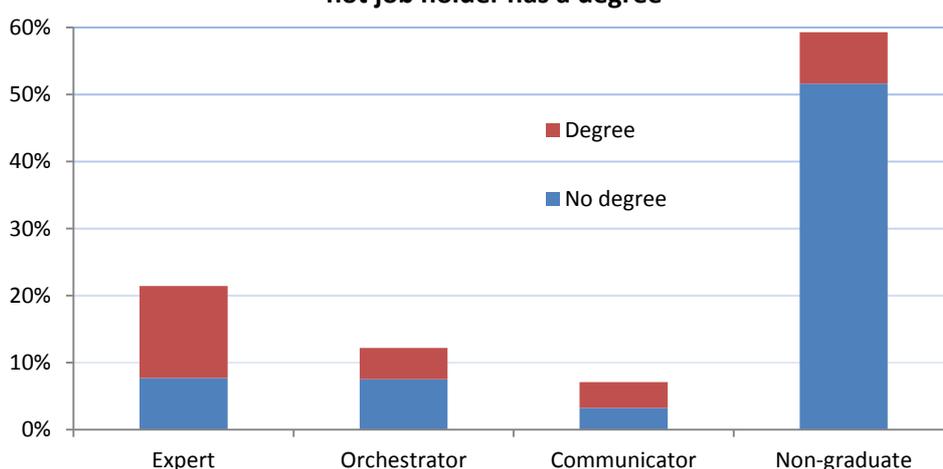
**Figure 2: Occupation of current job (SOC[HE]) by age group**



Source: UK Labour Force Surveys, January 2011 – September 2012.

Figure 3 indicates the importance of high-level qualifications (first degree or higher) in these categories. This is an important point as far as validation of these categories is concerned. In our evaluation of job descriptions, no consideration was given to job descriptions, which stated that entry into a specific occupational area requires a degree. Almost two thirds of full-time employees allocated to the 'expert' category had a first degree or higher. For 'communicators' the proportion is approximately 50 per cent and for orchestrators approximately 30 per cent. It is important to remember that this figure is based on all those in employment aged over 22 and it might be assumed that the proportions of graduates are higher at the younger end of the age distribution in most occupations. We note that full-time employees with a first degree or higher constitute over 10 per cent of those employed in occupations which we have characterised as 'non-graduate' occupations. This illustrates the inexact nature of occupational classification and the difference of approach that we are now taking to it.

**Figure 3: Occupation of current job (SOC[HE]) by whether or not job holder has a degree**

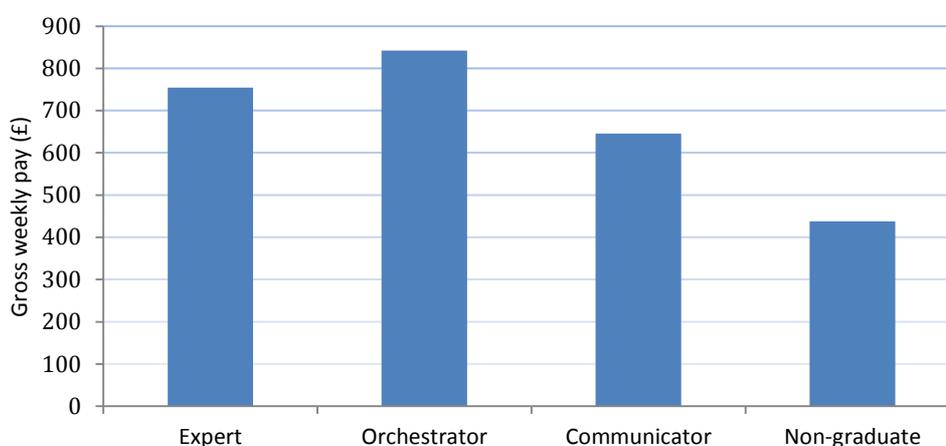


Source: UK Labour Force Surveys, January 2011 – September 2012.

Figure 4 is indicative of the so-called 'earnings premium' associated with the three 'high knowledge/skill' categories. Jobs which rely predominantly on orchestration skills and knowledge that can be acquired through HE (though more generally in combination with experience) tend have the highest average gross weekly earning, followed by occupations where expertise is the predominant attribute, then occupations which demand communication skills. However, there is a wide range of factors that confound these comparisons. Earnings relate to age and, as we have shown, post holders who are classified as 'orchestrators' tend to be older than the occupants of other categories. Qualifications and experience are normally rewarded relative to lower-qualified and less experienced job-holders in the labour market, and these categories have differing levels of qualifications within them.

To disentangle these various influences on earning, we conducted a multivariate analysis of the skill/knowledge earnings premium.

**Figure 4: Mean gross weekly pay in main job (SOC[HE])**



Source: UK Labour Force Surveys, January 2011 – September 2012.

Table 1 shows the results of this analysis. Entering the three skill/knowledge categories on their own in the regression model shows that the raw premia (as indicated in Figure 4) range from 38 per cent to 55 per cent. In the presence of controls (including whether or not the post holder has a degree), the premia fall but remain highly significant. In other words, there is a link between the high levels of skills and knowledge we have identified in the groups of occupations and pay. Full details of the regression model and the statistical significance of these results are shown in Appendix Table 2.

**Table 1: Raw and controlled earnings premia associated with knowledge/skill categories of SOC(HE) 2010**

	Raw premium	In presence of controls
Expert	55%	39%
Orchestrator	57%	44%
Communicator	38%	30%
Non-graduate	Ref.	Ref.

Source: Appendix table 2

Using this same set of controls on earnings, we replace the three graduate categories with the points scores as shown in Appendix Table 1. Table 2 shows the effect that each additional point has on gross weekly earnings within the threefold knowledge/skill space of the classification.

**Table 2: Raw and controlled earnings premia associated with each additional point in knowledge/skill categories of SOC(HE) 2010**

	Raw points score	In presence of controls
Expert	11%	8%
Orchestrator	5%	3%
Communicator	0%	0%

Source: Appendix table 3

This analysis indicates that, of the three dimensions of knowledge and skills we have identified for the construction of the new classification, it is expertise that is the most highly-rewarded, with each additional point on our qualitative scoring of this dimension affording an 8 per cent increase in earnings. Strategic skills and knowledge are rewarded at a lesser rate – 3 per cent per point, while we find no relationship between the points we have allocated for communication of knowledge. This implies that the higher earnings premium associated with this category and shown in Table 1 derives from the expertise and orchestration knowledge associated with occupations we have categorised as high in communication skills/knowledge rather than the communication skills dimension *per se*.

#### *Futuretrack and SOC(HE) 2010*

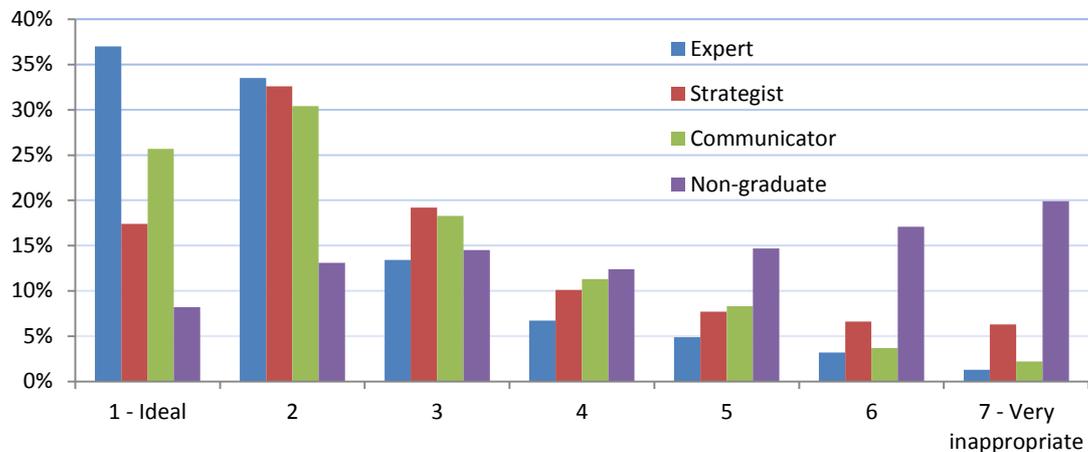
Futuretrack is a longitudinal survey of 2005/06 applicants to study full-time on UK undergraduate degree courses. The latest wave of data from this cohort was collected in November 2001 to February 2012. We confine the analysis to UK-domiciled applicants who graduated in 2009 and 2010 and are or have been in employment or self-employed between graduation and the point of survey. The survey included a full occupational history, along with useful indicators of job quality, earnings, subjective assessment of high level competences developed on their courses and used in their current employment, and their perceptions of the appropriateness of their current employment for somebody with their qualifications<sup>10</sup>.

Figure 5 reveals how responses on the last of these measures are related to the occupational categories of SOC(HE). It shows that over 84 per cent of those who had accessed jobs we label as *expert* had scored their jobs between 1-3, at the ‘appropriate’ end of the scale, whereas just under 70 per cent of the *Orchestrator* job-holders had done, along with just over 74 per cent of the *communicators* – and as with the LFS data above, expertise seems was most highly correlated with the highest rating. Conversely, only 35 per cent of those in jobs which we thought less

<sup>10</sup> <http://www2.warwick.ac.uk/fac/soc/ier/futuretrack/what/>

likely to require graduate-level education considered their jobs appropriate and less than 10 per cent thought them ideal.

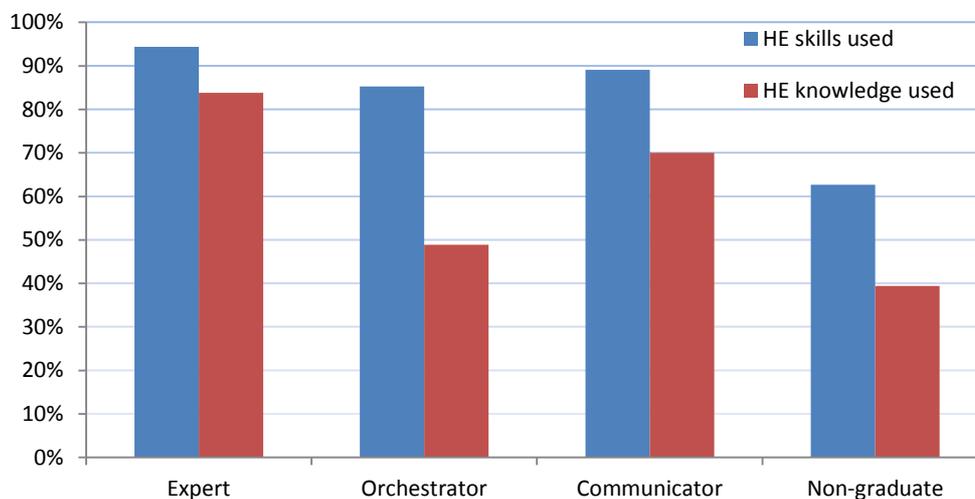
**Figure 5: Appropriateness of current job for someone with your qualifications**



Source: Futuretrack Wave 4 respondents (UK citizens with no postgraduate study)

The most obvious indication of whether graduates are in appropriate jobs is the extent to which they are required to use the knowledge and skills they had developed as undergraduates. Figure 6 shows respondents' evaluations of this for their current job.

**Figure 6: Use of HE skills and knowledge in current job**



Source: Futuretrack Wave 4 respondents (UK citizens with no postgraduate study)

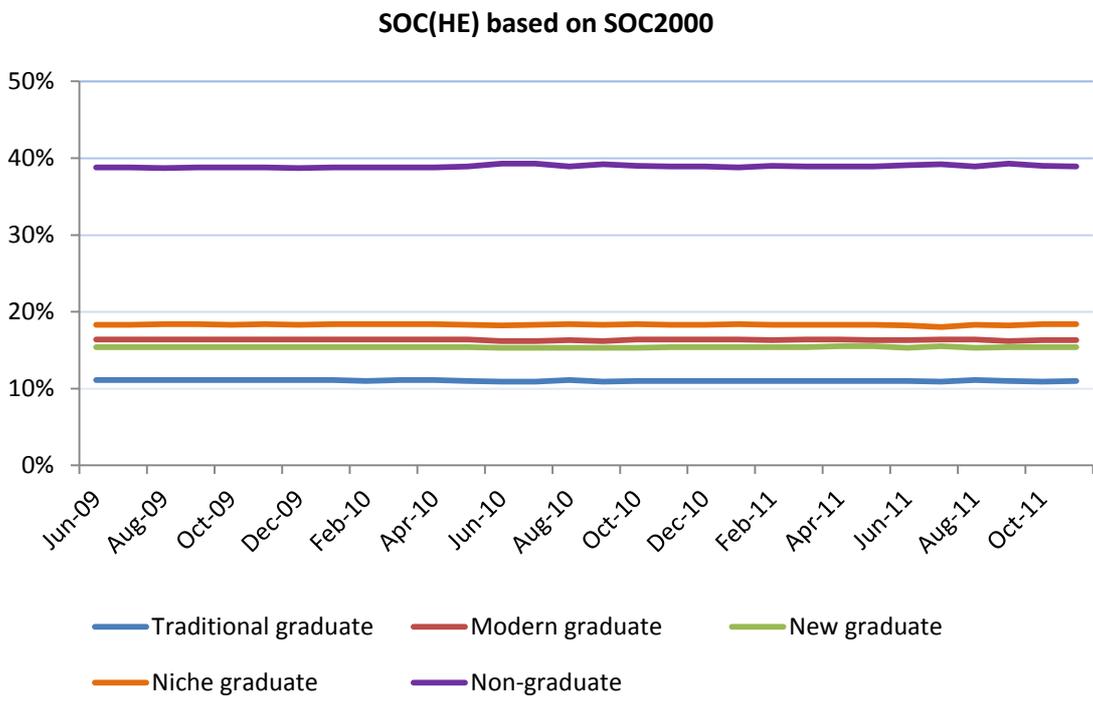
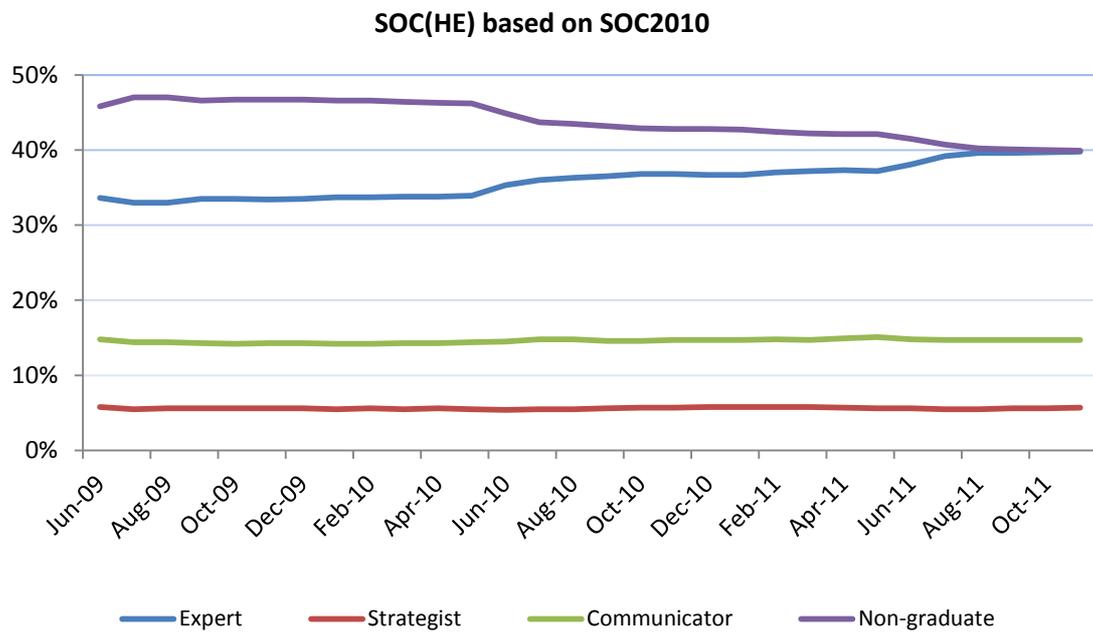
Figure 6 reinforces the applicability of the classification. Both knowledge and skills are complex concepts and evaluation of their use is necessarily subjective and both the levels of skills and knowledge acquired and the interpretations of their use will be different. However, the pattern of perception and use is congruent with the classification criteria on which we constructed the taxonomy.

Finally, we use the new classification to examine the employment following graduation for Futuretrack respondents who undertook a three year degree course.

We take advantage of the fact that the occupational histories of Futuretrack respondents were coded to SOC2000 and SOC2010. Here we restrict the analysis to those who completed a three year undergraduate course in 2009. Figure 7 shows this information, contrasting the occupational histories of graduates classified to SOC(HE) based on SOC2000 with the same information classified to SOC(HE) based on SOC2010. Previous cohort tracking studies had shown that a significant proportion of new graduates begin their post-university careers in unequivocally non-graduate jobs, but showed a propensity to increasingly enter jobs requiring degrees and using their graduate knowledge and skills as time went on (Purcell *et al* 2005, Elias *et al* 1999). Labour market integration for the Futuretrack cohort has been more difficult than for previous generations. The global recession has had an impact on employers' recruitment practices in the UK, including the recruitment of highly qualified employees (UKCES 2011), and this may have affected opportunities for the graduating class of 2009.

The previous version of SOC(HE) does not reveal any net movement out of non-graduate jobs. This is surprising, given that a significant number of these graduates from three-year undergraduate courses went on to undertake and complete a post graduate course. As these postgraduates enter the labour market one or two years later than those with an undergraduate degree, we expect that many will move directly into graduate level jobs. The new version of SOC(HE) does reveal such net movement out of non-graduate jobs and into expert jobs among the occupational histories. Through its ability to capture this movement from the more broadly defined group of occupations we term 'non-graduate jobs', the new version of the classification appears to have the potential to yield improved information about the dynamics of graduate careers.

**Figure 7: Employed graduates (UK citizens only), occupational histories June 2009 - November 2011**



Source: Futuretrack wave 4 respondents (UK citizens who completed a three year undergraduate course and were aged under 35 in 2011).

## Comparability between previous and new versions of SOC(HE)

Previous versions of SOC(HE), based on SOC90 or SOC2000, identified four categories of graduate jobs (traditional, modern, new and *niche*). The first three categories are associated with the decades in which jobs in each group had become typical jobs for graduates. The fourth category was established to cater for occupations in which ‘pockets’ of jobs existed within a particular unit group of the Standard Occupational Classification where graduate skills and knowledge were being utilised, yet the majority of jobs within the unit group were not graduate jobs. The revised version identifies graduate jobs in three categories, reflecting the relationship between the types of skills and experience required for competent performance of the associated tasks and their links to higher education. Given this different conceptual approach, there is no direct way in which the previous four and the three new categories of graduate jobs can be compared. Nonetheless, each version of the classification has a ‘non-graduate’ category and it is of interest to illustrate how the share of such jobs may be affected by reclassification. We anticipate that the share of jobs categorised as non-graduate in the revised (SOC2010) version of SOC(HE) will be somewhat higher than in the previous version, given the detailed attention that has been given to analysis of the skills content of jobs and the refinements in classification of occupations afforded by SOC2010 compared with SOC2000.

Using Labour Force Survey data from 1994 to 2012 and for employees aged 22-34, Table 3 shows the share of jobs that are defined as non-graduate jobs in each version of the classification. Comparing SOC(HE) based on SOC90 with the version based on SOC2000, the proportion of jobs held by 22-34 year olds classified as non-graduate jobs drops significantly over this 15 year period, particularly for young women. While this could be a consequence of reclassification, additional analysis shows this not to be the case<sup>11</sup>. The decline in the proportion of non-graduate jobs reflects the growth of professional, associate professional and technical jobs. Examining the proportion of degree holders within non graduate jobs (the shaded columns of table 3), we note the significant rise in percentage of degree holders in such jobs over this period. For young women, the rise is from 4.5 per cent to 17.2 per cent. However, graduates entering the labour market in 2009/10 entered the labour market during the biggest post-war recession, with virtually no increase in demand from traditional graduate employers and a freeze on new appointments by government departments and agencies (AGR 2013, 2010; High Fliers 2013, 2012). Comparing the previous version of SOC(HE) based on SOC2000 with the current version based on SOC2010, the information in Table 3 indicates, as anticipated, an

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<sup>11</sup> Analysis of dual coded Labour Force Survey data for the Winter quarter 1996/97 showed that 64 per cent of persons aged 22-34 years were classified to non-graduate jobs via the SOC90 version of SOC(HE), compared with 64.1 per cent classified via the SOC2000 version of SOC(HE).

increase in the proportion of young people classified to non-graduate jobs. The proportion of young male graduates in non-graduate jobs is 6 per cent higher on the new classification in 2011/12 compared with the estimate for 2009/10 based on the previous classification. Given that these two periods are only two years apart, it is reasonable to assume that most of the rise is a consequence of the redefinition of SOC(HE) and the occupational classification revisions entailed in the shift to SOC2010. For young women the difference is 7 per cent. As such, an increase in the proportion in non-graduate jobs cannot be attributed solely to an increase in HE participation.

To explore the impact of reclassification alone we make use of Labour Force Survey data that were coded to SOC2000 and SOC2010. For one complete cohort of LFS respondents<sup>12</sup> this facilitated a cross-classification of the previous with the new versions of SOC(HE). For this specific group of individuals, the proportion classified to non-graduate jobs in the new version of SOC(HE) is 7 per cent higher for men and 6.5 per cent higher for women compared with the previous version. We conclude therefore that there has been no discernible rise in the proportion of young graduates in non-graduate jobs over the last three years and that the observed increase is attributable to the introduction of the new classification.

**Table 3 Percentage of all occupations classified as non-graduate occupations and percentage degree-holders within non-graduate occupations by gender, 22-34 year olds.**

	1994/5: SOC(HE) based on SOC90		2009/10: SOC(HE) based on SOC2000		2011/12: SOC(HE) based on SOC2010	
	% in non-graduate occupations	% with a degree in non-graduate occupations	% in non-graduate occupations	% with a degree in non-graduate occupations	% in non-graduate occupations	% with a degree in non-graduate occupations
Males	63.8	3.7	59.9	12.2	67.6	18.2
Females	67.4	4.5	56.9	17.2	63.4	24.1
Total	65.5	4.1	58.4	14.6	65.5	21.0

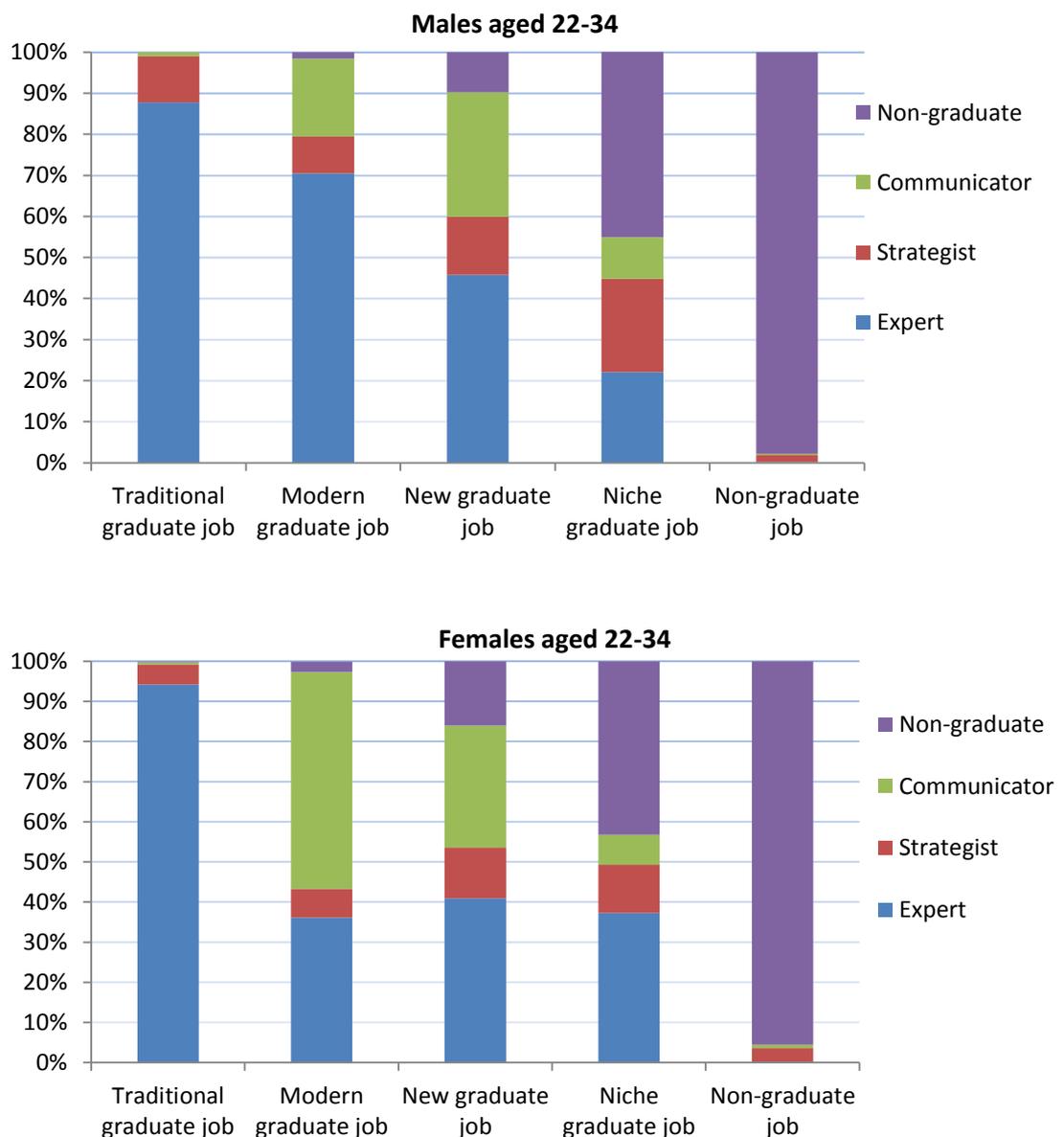
Source: UK Labour Force Surveys, 1994/95 (8 quarters), 2009/10 (8 quarters), 2011/12 (7 quarters): respondents recorded at first appearance only.

Figure 8 shows the relationship between the previous and the current version of SOC(HE), again focussing exclusively upon the Labour Force Survey respondents who had their occupational information coded to both SOC2000 and SOC2010. For respondents aged 22 to 34 years, and for males and females separately, this shows how the previous categories of SOC(HE) based on SOC2000 map into the new

<sup>12</sup> Respondents first entering the Labour Force Survey in January 2011 and remaining in the survey until March 2012, plus all those entering the Labour Force Survey in the four subsequent quarters had their occupational data coded to SOC2000 and SOC2010.

version based on SOC2010. For both young men and young women, the greatest degree of correspondence is between what were previously termed ‘traditional’ graduate jobs and what we now classify as ‘expert’ graduate jobs’ and between non-graduate jobs in each version of the classification. For both men and women, 45 per cent of jobs we previously classified as ‘niche’ graduate jobs are now classed as non-graduate jobs. The greatest difference between men and women is in the set of jobs previously classified as ‘modern’ graduate jobs. For women the majority of such jobs are classed as ‘communicators’. For men more than half such jobs fall into the ‘expert’ category.

**Figure 8: The relationship between SOC(HE) based on SOC2000 and SOC(HE) based on SOC2010, all in employment aged 22-34 years**



Source: Labour Force Surveys, 2011-2012 (5 quarters) – respondents recorded once only

## Conclusion

We have described a new approach that we have taken to the development of a classification that can be used for analysis of the dynamic relationship between higher education and the labour market. Based upon a detailed analysis of the structure and composition of the 2010 Standard Occupational Classification (SOC2010) we describe a four-fold classification of jobs - SOC(HE)2010 - that can be derived from occupational data coded to SOC2010. We include tests of the validity of the classification, concluding that the new approach provides a useful and more instructive way of monitoring change in the labour market and the integration of graduates into employment, listed as strengths of the previous version of SOC(HE) by HEFCE (2011:17). In particular, it overcomes the main identified weakness of the previous version, that it was historically grounded and developed via a methodology that could not be sustained in the longer term. It is also easier for users to understand and engage with the principles of its construction by providing detail related to occupational content and the knowledge and skills required to access and fulfil the job requirements. It can consequently be related to the knowledge, skills and curricula used on different higher education courses, and has the potential to shed light on the ways in which the developing 'knowledge society' makes use of and is shaped by higher education. It consequently provides a useful mechanism with which to monitor and make sense of the changing demand for knowledge, skills and qualifications. However, it tells us only about those in employment at any given time, so that in considering the extent to which there is change in the demand for different types of knowledge and skills, it will be important to relate the patterns it reveals to the wider labour market participation of recent graduates.

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**Appendix Table 1: Unit groups of SOC2010, showing allocated points for HE knowledge expertise, knowledge orchestration and communication and SOC(HE) category**

SOC 2010 unit group	Title of the unit group	Points score (1 = low, 9 = high)			SOC (HE) 2010 category
		HE knowledge expertise	HE knowledge orchestration	HE knowledge communication	
1115	Chief executives and senior officials	6	9	5	Orchestrator
1116	Elected officers and representatives	3	3	8	Communicator
1121	Production managers and directors in manufacturing	6	8	5	Orchestrator
1122	Production managers and directors in construction	6	8	5	Orchestrator
1123	Production managers and directors in mining and energy	6	8	5	Orchestrator
1131	Financial managers and directors	6	8	5	Orchestrator
1132	Marketing and sales directors	5	8	7	Orchestrator
1133	Purchasing managers and directors	6	8	5	Orchestrator
1134	Advertising and public relations directors	5	8	7	Orchestrator
1135	Human resource managers and directors	7	8	7	Orchestrator
1136	Information technology and telecommunications directors	6	8	5	Orchestrator
1139	Functional managers and directors n.e.c.	6	8	5	Orchestrator
1150	Financial institution managers and directors	6	8	5	Orchestrator
1161	Managers and directors in transport and distribution	6	8	5	Orchestrator
1162	Managers and directors in storage and warehousing	5	8	5	Orchestrator
1171	Officers in armed forces	5	8	5	Orchestrator
1172	Senior police officers	5	8	5	Orchestrator
1173	Senior officers in fire, ambulance, prison and related services	5	8	5	Orchestrator
1181	Health services and public health managers and directors	6	8	5	Orchestrator
1184	Social services managers and directors	6	8	6	Orchestrator
1190	Managers and directors in retail and wholesale	5	8	5	Orchestrator
1211	Managers and proprietors in agriculture and horticulture	5	6	5	Orchestrator
1213	Managers and proprietors in forestry, fishing and related services	5	6	5	Orchestrator
1221	Hotel and accommodation managers and proprietors	5	6	5	Orchestrator
1223	Restaurant and catering establishment managers and proprietors	5	5	5	Non-graduate
1224	Publicans and managers of licensed premises	5	6	5	Non-graduate
1225	Leisure and sports managers	5	5	5	Non-graduate
1226	Travel agency managers and	5	5	5	Non-graduate

	proprietors				
1241	Health care practice managers	5	5	5	Non-graduate
1242	Residential, day and domiciliary care managers and proprietors	5	4	5	Non-graduate
1251	Property, housing and estate managers	5	4	5	Non-graduate
1252	Garage managers and proprietors	5	5	4	Non-graduate
1253	Hairdressing and beauty salon managers and proprietors	5	4	5	Non-graduate
1254	Shopkeepers and proprietors – wholesale and retail	5	4	5	Non-graduate
1255	Waste disposal and environmental services managers	6	5	3	Expert
1259	Managers and proprietors in other services n.e.c.	5	5	5	Non-graduate
2111	Chemical scientists	9	2	3	Expert
2112	Biological scientists and biochemists	9	2	3	Expert
2113	Physical scientists	9	2	3	Expert
2114	Social and humanities scientists	9	2	5	Expert
2119	Natural and social science professionals n.e.c.	9	2	4	Expert
2121	Civil engineers	9	3	4	Expert
2122	Mechanical engineers	9	2	4	Expert
2123	Electrical engineers	9	2	4	Expert
2124	Electronics engineers	9	2	4	Expert
2126	Design and development engineers	9	2	4	Expert
2127	Production and process engineers	9	2	3	Expert
2129	Engineering professionals n.e.c.	9	2	4	Expert
2133	IT specialist managers	8	3	4	Expert
2134	IT project and programme managers	7	6	4	Orchestrator
2135	IT business analysts, architects and systems designers	9	3	5	Expert
2136	Programmers and software development professionals	9	2	3	Expert
2137	Web design and development professionals	7	5	8	Communicator
2139	Information technology and telecommunications professionals n.e.c.	7	2	3	Expert
2141	Conservation professionals	7	2	5	Expert
2142	Environment professionals	7	3	4	Expert
2150	Research and development managers	8	7	5	Expert
2211	Medical practitioners	9	3	5	Expert
2212	Psychologists	9	1	6	Expert
2213	Pharmacists	9	2	5	Expert
2214	Ophthalmic opticians	9	2	4	Expert
2215	Dental practitioners	9	2	4	Expert
2216	Veterinarians	9	1	4	Expert

2217	Medical radiographers	7	1	4	Expert
2218	Podiatrists	7	1	4	Expert
2219	Health professionals n.e.c.	6	1	4	Expert
2221	Physiotherapists	7	1	4	Expert
2222	Occupational therapists	7	1	4	Expert
2223	Speech and language therapists	7	1	4	Expert
2229	Therapy professionals n.e.c.	7	1	4	Expert
2231	Nurses	7	3	5	Expert
2232	Midwives	7	2	5	Expert
2311	Higher education teaching professionals	9	3	8	Expert
2312	Further education teaching professionals	7	2	8	Expert
2314	Secondary education teaching professionals	7	2	8	Expert
2315	Primary and nursery education teaching professionals	6	2	8	Communicator
2316	Special needs education teaching professionals	6	2	8	Communicator
2317	Senior professionals of educational establishments	6	5	7	Expert
2318	Education advisers and school inspectors	7	6	6	Expert
2319	Teaching and other educational professionals n.e.c.	7	2	8	Expert
2412	Barristers and judges	9	4	7	Expert
2413	Solicitors	9	4	6	Expert
2419	Legal professionals n.e.c.	7	5	5	Expert
2421	Chartered and certified accountants	7	4	3	Expert
2423	Management consultants and business analysts	7	9	6	Orchestrator
2424	Business and financial project management professionals	7	7	4	Orchestrator
2425	Actuaries, economists and statisticians	8	4	3	Expert
2426	Business and related research professionals	8	4	4	Expert
2429	Business, research and administrative professionals n.e.c.	7	6	5	Expert
2431	Architects	9	6	5	Expert
2432	Town planning officers	7	6	6	Expert
2433	Quantity surveyors	7	4	3	Expert
2434	Chartered surveyors	7	4	4	Expert
2435	Chartered architectural technologists	7	5	3	Expert
2436	Construction project managers and related professionals	7	6	5	Expert
2442	Social workers	7	5	6	Expert
2443	Probation officers	7	3	6	Expert
2444	Clergy	7	3	8	Communicator
2449	Welfare professionals n.e.c.	7	3	4	Expert

2451	Librarians	7	2	5	Expert
2452	Archivists and curators	9	2	5	Expert
2461	Quality control and planning engineers	7	4	4	Expert
2462	Quality assurance and regulatory professionals	7	4	4	Expert
2463	Environmental health professionals	7	3	6	Expert
2471	Journalists, newspaper and periodical editors	7	4	9	Communicator
2472	Public relations professionals	6	5	9	Communicator
2473	Advertising accounts managers and creative directors	6	5	9	Communicator
3111	Laboratory technicians	4	1	2	Non-graduate
3112	Electrical and electronics technicians	4	1	2	Non-graduate
3113	Engineering technicians	4	1	2	Non-graduate
3114	Building and civil engineering technicians	4	1	2	Non-graduate
3115	Quality assurance technicians	4	1	2	Non-graduate
3116	Planning, process and production technicians	4	1	2	Non-graduate
3119	Science, engineering and production technicians n.e.c.	4	1	2	Non-graduate
3121	Architectural and town planning technicians	4	1	2	Non-graduate
3122	Draughtspersons	4	1	2	Non-graduate
3131	IT operations technicians	5	1	2	Non-graduate
3132	IT user support technicians	5	1	5	Non-graduate
3213	Paramedics	5	4	5	Non-graduate
3216	Dispensing opticians	5	1	5	Non-graduate
3217	Pharmaceutical technicians	5	1	2	Non-graduate
3218	Medical and dental technicians	5	1	2	Non-graduate
3219	Health associate professionals n.e.c.	6	1	4	Expert
3231	Youth and community workers	5	4	5	Non-graduate
3233	Child and early years officers	5	4	5	Non-graduate
3234	Housing officers	5	2	5	Non-graduate
3235	Counsellors	5	3	5	Non-graduate
3239	Welfare and housing associate professionals n.e.c.	6	4	5	Expert
3311	NCOs and other ranks	4	3	2	Non-graduate
3312	Police officers (sergeant and below)	4	3	4	Non-graduate
3313	Fire service officers (watch manager and below)	4	3	4	Non-graduate
3314	Prison service officers (below principal officer)	4	3	4	Non-graduate
3315	Police community support officers	4	2	5	Non-graduate
3319	Protective service associate professionals n.e.c.	4	2	4	Non-graduate
3411	Artists	7	1	6	Expert
3412	Authors, writers and translators	7	3	9	Communicator
3413	Actors, entertainers and	6	1	9	Communicator

	presenters				
3414	Dancers and choreographers	5	1	5	Non-graduate
3415	Musicians	7	1	6	Expert
3416	Arts officers, producers and directors	7	6	9	Communicator
3417	Photographers, audio-visual and broadcasting equipment operators	7	1	6	Expert
3421	Graphic designers	7	1	7	Communicator
3422	Product, clothing and related designers	7	1	4	Expert
3441	Sports players	5	2	4	Non-graduate
3442	Sports coaches, instructors and officials	5	5	5	Non-graduate
3443	Fitness instructors	5	2	5	Non-graduate
3511	Air traffic controllers	6	4	5	Expert
3512	Aircraft pilots and flight engineers	6	3	4	Expert
3513	Ship and hovercraft officers	6	3	4	Expert
3520	Legal associate professionals	5	2	5	Non-graduate
3531	Estimators, valuers and assessors	5	2	3	Non-graduate
3532	Brokers	6	4	3	Expert
3533	Insurance underwriters	6	4	3	Expert
3534	Finance and investment analysts and advisers	6	4	5	Expert
3535	Taxation experts	6	3	4	Expert
3536	Importers and exporters	5	5	5	Non-graduate
3537	Financial and accounting technicians	4	1	1	Non-graduate
3538	Financial accounts managers	4	3	2	Non-graduate
3539	Business and related associate professionals n.e.c.	6	2	5	Expert
3541	Buyers and procurement officers	4	3	6	Communicator
3542	Business sales executives	4	2	6	Communicator
3543	Marketing associate professionals	4	1	6	Communicator
3544	Estate agents and auctioneers	4	2	5	Non-graduate
3545	Sales accounts and business development managers	4	2	6	Communicator
3546	Conference and exhibition managers and organisers	4	5	7	Communicator
3550	Conservation and environmental associate professionals	5	3	5	Non-graduate
3561	Public services associate professionals	5	1	5	Non-graduate
3562	Human resources and industrial relations officers	7	3	6	Expert
3563	Vocational and industrial trainers and instructors	5	3	5	Non-graduate
3564	Careers advisers and vocational guidance specialists	6	3	5	Expert
3565	Inspectors of standards and regulations	6	2	3	Expert
3567	Health and safety officers	4	2	5	Non-graduate
4112	National government administrative occupations	4	6	4	Orchestrator

4113	Local government administrative occupations	4	6	4	Orchestrator
4114	Officers of non-governmental organisations	4	5	4	Non-graduate
4121	Credit controllers	3	1	4	Non-graduate
4122	Book-keepers, payroll managers and wages clerks	3	1	2	Non-graduate
4123	Bank and post office clerks	3	1	3	Non-graduate
4124	Finance officers	3	1	3	Non-graduate
4129	Financial administrative occupations n.e.c.	3	1	3	Non-graduate
4131	Records clerks and assistants	3	1	1	Non-graduate
4132	Pensions and insurance clerks and assistants	3	1	1	Non-graduate
4133	Stock control clerks and assistants	3	1	1	Non-graduate
4134	Transport and distribution clerks and assistants	3	1	1	Non-graduate
4135	Library clerks and assistants	3	1	2	Non-graduate
4138	Human resources administrative occupations	3	1	4	Non-graduate
4151	Sales administrators	3	1	3	Non-graduate
4159	Other administrative occupations n.e.c.	3	1	3	Non-graduate
4161	Office managers	3	2	3	Non-graduate
4162	Office supervisors	3	2	3	Non-graduate
4211	Medical secretaries	3	1	3	Non-graduate
4212	Legal secretaries	3	1	3	Non-graduate
4213	School secretaries	2	1	3	Non-graduate
4214	Company secretaries	3	1	2	Non-graduate
4215	Personal assistants and other secretaries	4	1	3	Non-graduate
4216	Receptionists	2	1	4	Non-graduate
4217	Typists and related keyboard occupations	2	1	1	Non-graduate
5111	Farmers	4	4	1	Non-graduate
5112	Horticultural trades	4	2	1	Non-graduate
5113	Gardeners and landscape gardeners	4	2	1	Non-graduate
5114	Groundsmen and greenkeepers	2	2	1	Non-graduate
5119	Agricultural and fishing trades n.e.c.	4	2	1	Non-graduate
5211	Smiths and forge workers	4	2	1	Non-graduate
5212	Moulders, core makers and die casters	4	2	1	Non-graduate
5213	Sheet metal workers	4	2	1	Non-graduate
5214	Metal plate workers, and riveters	4	2	1	Non-graduate
5215	Welding trades	4	2	1	Non-graduate
5216	Pipe fitters	2	2	1	Non-graduate
5221	Metal machining setters and setter-operators	2	2	1	Non-graduate
5222	Tool makers, tool fitters and markers-out	4	2	1	Non-graduate
5223	Metal working production and maintenance fitters	4	2	1	Non-graduate

5224	Precision instrument makers and repairers	4	2	1	Non-graduate
5225	Air-conditioning and refrigeration engineers	4	2	1	Non-graduate
5231	Vehicle technicians, mechanics and electricians	4	2	1	Non-graduate
5232	Vehicle body builders and repairers	4	2	1	Non-graduate
5234	Vehicle paint technicians	2	2	1	Non-graduate
5235	Aircraft maintenance and related trades	4	2	1	Non-graduate
5236	Boat and ship builders and repairers	4	2	1	Non-graduate
5237	Rail and rolling stock builders and repairers	2	2	1	Non-graduate
5241	Electricians and electrical fitters	4	2	1	Non-graduate
5242	Telecommunications engineers	4	2	3	Non-graduate
5244	TV, video and audio engineers	4	2	1	Non-graduate
5245	IT engineers	4	2	1	Non-graduate
5249	Electrical and electronic trades n.e.c.	4	2	1	Non-graduate
5250	Skilled metal, electrical and electronic trades supervisors	4	2	3	Non-graduate
5311	Steel erectors	4	2	1	Non-graduate
5312	Bricklayers and masons	4	2	1	Non-graduate
5313	Roofers, roof tilers and slaters	4	2	1	Non-graduate
5314	Plumbers and heating and ventilating engineers	4	2	1	Non-graduate
5315	Carpenters and joiners	4	2	1	Non-graduate
5316	Glaziers, window fabricators and fitters	4	2	1	Non-graduate
5319	Construction and building trades n.e.c.	4	2	1	Non-graduate
5321	Plasterers	4	2	1	Non-graduate
5322	Floorers and wall tilers	4	2	1	Non-graduate
5323	Painters and decorators	4	2	1	Non-graduate
5330	Construction and building trades supervisors	4	2	3	Non-graduate
5411	Weavers and knitters	4	2	1	Non-graduate
5412	Upholsterers	4	2	1	Non-graduate
5413	Footwear and leather working trades	4	2	1	Non-graduate
5414	Tailors and dressmakers	4	2	1	Non-graduate
5419	Textiles, garments and related trades n.e.c.	4	2	1	Non-graduate
5421	Pre-press technicians	4	2	1	Non-graduate
5422	Printers	4	2	1	Non-graduate
5423	Print finishing and binding workers	4	2	1	Non-graduate
5431	Butchers	4	2	1	Non-graduate
5432	Bakers and flour confectioners	4	2	1	Non-graduate
5433	Fishmongers and poultry dressers	4	2	1	Non-graduate
5434	Chefs	4	2	2	Non-graduate
5435	Cooks	4	2	1	Non-graduate

5436	Catering and bar managers	3	2	5	Non-graduate
5441	Glass and ceramics makers, decorators and finishers	4	2	1	Non-graduate
5442	Furniture makers and other craft woodworkers	4	2	1	Non-graduate
5443	Florists	4	2	3	Non-graduate
5449	Other skilled trades n.e.c.	4	2	1	Non-graduate
6121	Nursery nurses and assistants	3	2	5	Non-graduate
6122	Childminders and related occupations	3	2	5	Non-graduate
6123	Playworkers	3	2	5	Non-graduate
6125	Teaching assistants	3	2	5	Non-graduate
6126	Educational support assistants	3	2	5	Non-graduate
6131	Veterinary nurses	4	2	3	Non-graduate
6132	Pest control officers	4	2	3	Non-graduate
6139	Animal care services occupations n.e.c.	3	2	3	Non-graduate
6141	Nursing auxiliaries and assistants	3	2	4	Non-graduate
6142	Ambulance staff (excluding paramedics)	3	2	4	Non-graduate
6143	Dental nurses	2	1	3	Non-graduate
6144	Houseparents and residential wardens	3	2	3	Non-graduate
6145	Care workers and home carers	3	1	5	Non-graduate
6146	Senior care workers	3	4	6	Communicator
6147	Care escorts	2	1	3	Non-graduate
6148	Undertakers, mortuary and crematorium assistants	3	2	5	Non-graduate
6211	Sports and leisure assistants	3	2	3	Non-graduate
6212	Travel agents	4	2	5	Non-graduate
6214	Air travel assistants	3	2	3	Non-graduate
6215	Rail travel assistants	3	2	3	Non-graduate
6219	Leisure and travel service occupations n.e.c.	3	2	3	Non-graduate
6221	Hairdressers and barbers	3	1	3	Non-graduate
6222	Beauticians and related occupations	3	1	3	Non-graduate
6231	Housekeepers and related occupations	3	2	3	Non-graduate
6232	Caretakers	2	1	1	Non-graduate
6240	Cleaning and housekeeping managers and supervisors	2	2	5	Non-graduate
7111	Sales and retail assistants	2	1	3	Non-graduate
7112	Retail cashiers and check-out operators	2	1	3	Non-graduate
7113	Telephone salespersons	2	1	5	Non-graduate
7114	Pharmacy and other dispensing assistants	3	2	3	Non-graduate
7115	Vehicle and parts salespersons and advisers	2	1	5	Non-graduate
7121	Collector salespersons and credit agents	2	1	3	Non-graduate
7122	Debt, rent and other cash collectors	2	1	3	Non-graduate

7123	Roundspersons and van salespersons	2	1	3	Non-graduate
7124	Market and street traders and assistants	2	1	3	Non-graduate
7125	Merchandisers and window dressers	3	2	3	Non-graduate
7129	Sales related occupations n.e.c.	2	1	3	Non-graduate
7130	Sales supervisors	2	1	5	Non-graduate
7211	Call and contact centre occupations	2	1	3	Non-graduate
7213	Telephonists	2	1	3	Non-graduate
7214	Communication operators	2	1	3	Non-graduate
7215	Market research interviewers	3	1	5	Non-graduate
7219	Customer service occupations n.e.c.	2	1	3	Non-graduate
7220	Customer service managers and supervisors	3	3	5	Non-graduate
8111	Food, drink and tobacco process operatives	2	1	1	Non-graduate
8112	Glass and ceramics process operatives	2	1	1	Non-graduate
8113	Textile process operatives	2	1	1	Non-graduate
8114	Chemical and related process operatives	2	1	1	Non-graduate
8115	Rubber process operatives	2	1	1	Non-graduate
8116	Plastics process operatives	2	1	1	Non-graduate
8117	Metal making and treating process operatives	2	1	1	Non-graduate
8118	Electroplaters	2	1	1	Non-graduate
8119	Process operatives n.e.c.	2	1	1	Non-graduate
8121	Paper and wood machine operatives	2	1	1	Non-graduate
8122	Coal mine operatives	2	1	1	Non-graduate
8123	Quarry workers and related operatives	2	1	1	Non-graduate
8124	Energy plant operatives	2	1	1	Non-graduate
8125	Metal working machine operatives	2	1	1	Non-graduate
8126	Water and sewerage plant operatives	2	1	1	Non-graduate
8127	Printing machine assistants	2	1	1	Non-graduate
8129	Plant and machine operatives n.e.c.	2	1	1	Non-graduate
8131	Assemblers (electrical and electronic products)	2	1	1	Non-graduate
8132	Assemblers (vehicles and metal goods)	2	1	1	Non-graduate
8133	Routine inspectors and testers	2	1	1	Non-graduate
8134	Weighers, graders and sorters	2	1	1	Non-graduate
8135	Tyre, exhaust and windscreen fitters	2	1	1	Non-graduate
8137	Sewing machinists	2	1	1	Non-graduate
8139	Assemblers and routine operatives n.e.c.	2	1	1	Non-graduate
8141	Scaffolders, staggers and riggers	2	1	1	Non-graduate
8142	Road construction operatives	2	1	1	Non-graduate

8143	Rail construction and maintenance operatives	2	1	1	Non-graduate
8149	Construction operatives n.e.c.	2	1	1	Non-graduate
8211	Large goods vehicle drivers	3	2	1	Non-graduate
8212	Van drivers	3	2	1	Non-graduate
8213	Bus and coach drivers	3	2	2	Non-graduate
8214	Taxi and cab drivers and chauffeurs	3	1	2	Non-graduate
8215	Driving instructors	4	1	3	Non-graduate
8221	Crane drivers	2	1	1	Non-graduate
8222	Fork-lift truck drivers	2	1	1	Non-graduate
8223	Agricultural machinery drivers	2	1	1	Non-graduate
8229	Mobile machine drivers and operatives n.e.c.	3	1	1	Non-graduate
8231	Train and tram drivers	4	1	1	Non-graduate
8232	Marine and waterways transport operatives	2	1	1	Non-graduate
8233	Air transport operatives	2	1	1	Non-graduate
8234	Rail transport operatives	2	1	1	Non-graduate
8239	Other drivers and transport operatives n.e.c.	2	1	1	Non-graduate
9111	Farm workers	2	1	1	Non-graduate
9112	Forestry workers	2	1	1	Non-graduate
9119	Fishing and other elementary agriculture occupations n.e.c.	2	1	1	Non-graduate
9120	Elementary construction occupations	2	1	1	Non-graduate
9132	Industrial cleaning process occupations	2	1	1	Non-graduate
9134	Packers, bottlers, canners and fillers	1	1	1	Non-graduate
9139	Elementary process plant occupations n.e.c.	1	1	1	Non-graduate
9211	Postal workers, mail sorters, messengers and couriers	1	1	1	Non-graduate
9219	Elementary administration occupations n.e.c.	2	1	1	Non-graduate
9231	Window cleaners	1	1	1	Non-graduate
9232	Street cleaners	1	1	1	Non-graduate
9233	Cleaners and domestics	1	1	1	Non-graduate
9234	Launderers, dry cleaners and pressers	1	1	1	Non-graduate
9235	Refuse and salvage occupations	1	1	1	Non-graduate
9236	Vehicle valeters and cleaners	1	1	1	Non-graduate
9239	Elementary cleaning occupations n.e.c.	1	1	1	Non-graduate
9241	Security guards and related occupations	1	1	1	Non-graduate
9242	Parking and civil enforcement occupations	1	1	3	Non-graduate
9244	School midday and crossing patrol occupations	1	1	3	Non-graduate
9249	Elementary security occupations n.e.c.	1	1	1	Non-graduate
9251	Shelf fillers	1	1	1	Non-graduate

9259	Elementary sales occupations n.e.c.	1	1	2	Non-graduate
9260	Elementary storage occupations	1	1	1	Non-graduate
9271	Hospital porters	1	1	2	Non-graduate
9272	Kitchen and catering assistants	1	1	1	Non-graduate
9273	Waiters and waitresses	1	1	4	Non-graduate
9274	Bar staff	1	1	4	Non-graduate
9275	Leisure and theme park attendants	1	1	1	Non-graduate
9279	Other elementary services occupations n.e.c.	1	1	1	Non-graduate

**Appendix Table 2: Linear regression model showing impact of SOC(HE) category on earning**

	Coefficient	Std. error	t
(Constant)	3.833	0.045	85.425
Age	0.055	0.002	26.262
(Age) <sup>2</sup>	-0.001	0.000	-24.657
Male	0.182	0.006	28.528
<i>Highest qualification</i>			
Doctorate	0.361	0.024	14.879
Masters	0.315	0.014	22.724
PGCE	0.142	0.020	7.008
Other postgrad	0.307	0.026	11.967
First degree	0.225	0.008	28.330
Below degree	Ref.		
<i>Area of residence</i>			
Inner London	0.222	0.017	13.348
Outer London	0.171	0.012	14.198
Rest of the SE	0.116	0.008	15.497
Northern Ireland	-0.062	0.021	-2.918
Rest of UK	Ref.		
Response was from proxy	-0.010	0.007	-1.560
<i>Children in household:</i>			
aged 0-2	-0.003	0.012	-0.268
aged 3-4	0.051	0.011	4.708
aged 5-9	0.042	0.009	4.424
aged 10-14	0.009	0.009	1.066
Tenure in current job (months)	0.001	0.000	24.216
Total usual hours in main job	0.017	0.000	43.494
<i>SOC(HE) 2010</i>			
Expert	0.351	0.008	41.963
Orchestrator	0.361	0.010	37.442
Communicator	0.246	0.012	20.661
Non-graduate	Ref.		

N = 20,455 R<sup>2</sup> = 0.431. Dependent variable is the natural logarithm of gross weekly earnings.

Source: UK Labour Force Surveys, January 2011 – March 2012

**Appendix Table 3: Linear regression model showing impact of SOC(HE) scores on earnings**

	Coefficient	Std. Error	t
(Constant)	3.651	0.044	82.965
Age	0.053	0.002	25.886
(Age) <sup>2</sup>	-0.001	0.000	-24.222
Male	0.168	0.007	25.804
<i>Highest qualification</i>			
Doctorate	0.287	0.024	11.946
Masters	0.273	0.014	19.991
PGCE	0.153	0.020	7.470
Other postgrad	0.261	0.025	10.367
First degree	0.196	0.008	24.923
Below degree	Ref.		
<i>Area of residence</i>			
Inner London	0.216	0.016	13.257
Outer London	0.170	0.012	14.419
Rest of the SE	0.110	0.007	14.986
Northern Ireland	-0.050	0.021	-2.424
Rest of UK	Ref.		
Response was from proxy	-0.01	0.007	-1.574
<i>Children in household:</i>			
aged 0-2	-0.008	0.012	-0.698
aged 3-4	0.047	0.011	4.485
aged 5-9	0.039	0.009	4.168
aged 10-14	0.005	0.008	0.597
Tenure in current job (months)	0.001	0.000	22.409
Total usual hours in main job	0.016	0.000	42.563
<i>SOC(HE) 2010 points score</i>			
Expertise knowledge	0.075	0.002	41.135
Strategic knowledge/skills	0.028	0.002	17.862
Communication knowledge/skills	0.001	0.002	0.395

N = 20,445 R<sup>2</sup> = 0.456. Dependent variable is the natural logarithm of gross weekly earnings.

Source: UK Labour Force Surveys, January 2011 – March 2012