**Review of HE student destinations and outcomes data:**

**Third working group meeting**

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# Brief overview of the assessment and measurement of skills

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Whenever a case is to be made for metrics, a number of questions need to be addressed. They include:

* What are we going to measure?
* Why are we trying to measure it?
* What are we going to use to measure it?
* Who is going to use the measure (and what for)?
* What do we want the output of the measure to be?

The question of skills measurement is a complex one with a rich literature, not least because “skills” mean different things for different people. There have been many and continued attempts to conceptualise skills and competencies over time, and these keep changing. In this note we will not dwell on the question of ‘what is a skill’. A ‘skill’ is what we end up measuring/assessing with the method and data available and no method will be perfect. A good review of multiple ways of assessing skills can be found in Haar et al (2005)[[1]](#footnote-1). Here we summarise relevant findings from that report, which is much wider than we need, and add recent advancements on skills assessment for the UK specifically, which have been many and rich.

## A practical taxonomy of skills assessments

**Input/Output based** – assessments of skills based on qualifications are known as based on input as in knowledge acquired with the qualification. The person is assessed by what they have done in the past not by what they do or can do at present. Output based assessments of skills are based on what the person is doing in actual activities or what the person could do using testing (cognitive, psychometric…)

**Direct/Indirect** - direct assessments are drawn from the person in surveys (self- assessment/reporting) or using tests, as above, so that the skills used or possessed by the person can be observed directly. Indirect assessments attribute skills levels to job roles and the person is given the skill level of the job role they hold.

Haar et al (2005) consider at length pros and cons of different types of assessment and whether some methods are better for some skills and less for others. Here we just look at broad advantages and disadvantages, bearing in mind that a majority of existing assessments use mixed methods.

## Studies of Skills in the UK and elsewhere

Input and direct measures are relatively easy to obtain as per counts of qualifiers as reported by the students. The jobs held by qualifiers of the same self-reported discipline (as finely defined as wanted – health management) are assumed to represent the skills of that discipline. Using these methods, we will always find that not all job holders will come from specific discipines, e.g. only 80% of health management job holders have a health degree (IES for UKCES Working Futures[[2]](#footnote-2)), which then implies that 20% have health management skills without having a degree that would be considered a health qualification. Still, this method is widely used, either by asking students what degree and what job they hold (DLHE), or by asking workers what level of education and degree they hold (LFS), or any combination of these. The recent paper from Universities UK**, ‘Supply and Demand for Higher Level Skills’[[3]](#footnote-3)** contains a good overview and infographics on indicators based on input direct measures, such as qualifiers, DLHE and the LFS.

Input and indirect measurements include assessments of skills based on the earnings of graduates by discipline and level of education. Wages depend on the job role and other personal attributes. Advances in methods (e.g. fixed effects in matching, quantile regressions, Oaxaca-Blinder decompositions), and better data sources (cohort studies, datasets of twins) have enabled us to “clean” estimates of these confounding factors, but the sheer range of factors and the challenge of measuring them means the process is never complete. Skills assessments based on earnings do not give detail as to what specific skills are of value among graduates of that discipline. Input and indirect measures can usefully be covered by the linked HMRC data.

Output and direct methods are very resource intensive but are becoming more widespread because they provide detail of what the person actually does or can do, whether in self reports or in tests or practice based appraisals. Several international skills assessments have been carried by the OECD to identify skills of the adult population using tests[[4]](#footnote-4). Tests are the most involved of methods although, if robustly implemented, they are also objective and unbiased. However, these tests – and hence changes in skills - are only captured infrequently.

More popular and potentially more frequent than tests are self-reports of skills deployed at work through specific activities. These involve asking the job holder about work activities or working conditions. In the UK successive waves of the UK Skills and Employment Survey[[5]](#footnote-5) have been able to identify a set of 10 generic skills out of 36 different activities[[6]](#footnote-6) and thus declare what skills are more important for what jobs. This method however does not identify skills that are not used at that particular job role. There is also a danger of attaching proficiency to the use of technology, e.g. important use of a pen at work means having writing skills.

Output and indirect methods are based on characteristics of the job role as assessed by someone other than the job holder. The most well-known of these are assessments of skills required for a role made by occupational psychologists (US Dictionary of Occupational Titles) and the employers perceptions of what are the skills requirements for the job. The US Dictionary of Occupations has been widely used because it describes in detail the competencies required for very finely defined job roles. This dictionary, now known as O\*Net[[7]](#footnote-7) is fantastically rich in detail but it is not culturally neutral (although Dickerson et al matched the US descriptors to the UK SOC in 2012 for the UKCES[[8]](#footnote-8)) and it is updated infrequently as it requires external detailed assessments of over 900 occupations using 277 skills/abilities descriptions[[9]](#footnote-9). Less detailed and therefore more frequent (but also based on perception rather than tasks/competencies) are employer assessment of how adequately skilled their workforce are and what skills are lacking, such as the UKCES Employer Skills Surveys and sector based questionnaires such as CBI/Pearson, Engineering UK, those conducted by other of the Sector Skills Councils.

Two recent studies in developing skills descriptors for 4-digit (e.g. very detailed) occupations specifically for the UK and using UK data are worth noting.

* Elias and Purcell (2013)[[10]](#footnote-10) use their judgement to determine the skill content of 4-digit occupations across three categories of skills defined in a prior study: specialist expertise, orchestrating expertise and communication expertise. They validate their skill content definition SOC(HE) looking at the characteristics of job holders and their earnings in the labour force survey.
* Green and Henseke (2014)[[11]](#footnote-11) use a composite index of of self-reports from workers on the degree requirements for their job, a subset of the aforementioned detailed job analysis questions, the importance of computers and past training, to impute an indicator of skills requirements also to 4-digit SOC units.

**Accepting the limitations of expert judgement of what matters for a graduate job or not, these two studies make it possible to classify the skill content of jobs held by graduates just with the SOC code of their job.**

**Alternatively, direct assessments of the skills possessed or deployed by graduates can be made by adding a short battery of questions that replicate the skills above, either by repeating some but not all of the job analysis questions from the Skills and Employment Survey – see footnote 5- or designing questions that can replicate Elias and Purcell expertise indicators.**

*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*

Elias and Purcell, 2013: 6.

The above stem from prior work for the **Futuretrack longitudinal project**[[12]](#footnote-12), which tracked applicants to higher education in 2005, and was conducted by Professor Kate Purcell and Professor Peter Elias of Warwick’s Institute of Employment Research examined the development of undergraduate and graduate skills and attributes[[13]](#footnote-13) using a framework derived from a variety of sources, notably the work of Brown and Hesketh[[14]](#footnote-14), and the 2008 report from the then-DIUS, ‘High Skills, High Value’[[15]](#footnote-15).

Elias and Purcell examined a large range of skills and attributes and tracked them through university and post-graduation using self-assessment survey. In Stage 3, final year students were asked to rate their own strengths in Written communication; spoken communication; numeracy skills; computer literacy; self-confidence; self-discipline; ability to work in a team; leadership skills and creativity, on a 5 point scale ranging from ‘Excellent’ to ‘Not very good’ and then to examine how well they thought their course had helped to develop a wider range of attributes: the ability to apply knowledge; ability to use numerical data; ability to work in a team; awareness of strengths/weaknesses; computer literacy; critical analysis; desire to go on learning; entrepreneurial/Enterprise skills; independence; inter-personal skills; logical thinking; presentation skills; problem-solving skills; research skills; self confidence; self discipline; self reliance; specialist knowledge; spoken communication; time management and written communication on another 5 point scale, from ‘Very Much’ to ‘Not At All’[[16]](#footnote-16)[[17]](#footnote-17).

Stage 4 of Futuretrack asked the cohort, by this time graduates, to look back and reflect on how their course enabled them to develop skills in written communication; spoken communication; numerical analysis; critical evaluation; research; presentation; innovative thinking; entrepreneurialism; teamworking; individual working and time management, using a self-assessment questionnaire on a 5 point scale[[18]](#footnote-18).

As a consequence, this project developed tools for graduates to both assess their perception of their own skills and attributed and to assess how their course had helped them to develop.

In the US, the **Gallup-Purdue Index**[[19]](#footnote-19) is a well-regarded survey of US graduates that aims to examine the long-term success of graduates through metrics other than employment and salary. Broken into three key themes; Workplace Engagement; Well-Being and Alumni Attachment, the aim is to go some way to discovering if graduate lead better lives as a result of their higher education experience. Each of the three themes is addressed by a series of questions. The Index is used by many US higher education institutions to assess the well-being and early career success of their graduates.

## Concluding Remarks

Ultimately, there is no hard-and-fast list of exactly the skills that graduates are supposed to develop and that employers expect them to have developed. The literature suggests that self-assessment tools, based on 5 point Likert scales, are established frameworks with which to examine the skills question and it may be prudent to adapt an existing, tested survey instrument with a list of skills and attributes that are currently used elsewhere (perhaps from multiple sources) to achieve the results we seek.

1. <http://www.pedz.uni-mannheim.de/daten/edz-b/gdbk/04/defining_strategy_final.pdf> [↑](#footnote-ref-1)
2. <https://www.gov.uk/government/publications/working-futures-2012-to-2022> [↑](#footnote-ref-2)
3. http://www.universitiesuk.ac.uk/highereducation/Pages/SupplyAndDemandForHigherLevelSkills.aspx [↑](#footnote-ref-3)
4. <http://www.oecd.org/edu/innovation-education/adultliteracy.htm> [↑](#footnote-ref-4)
5. <http://www.cardiff.ac.uk/research/projects/view/117804-skills-and-employment-survey-2012> [↑](#footnote-ref-5)
6. Section C on the questionnaire in the technical report contains the detailed job analysis questions, op cit. They are of the form, “in your job, how important is… making speeches/ persuading/ selling products/ physical strength/ operating machinery and so on until 36. Factor analysis groups these 36 into 10 generic skills. [↑](#footnote-ref-6)
7. http://www.onetonline.org/ [↑](#footnote-ref-7)
8. <http://dera.ioe.ac.uk/13850/1/evidence-report-44-developing-occupational-skills-profiles-for-the-uk-a-feasibility-study.pdf> [↑](#footnote-ref-8)
9. See <http://www.onetcenter.org/taxonomy/2009/updated.html> for a list of updates [↑](#footnote-ref-9)
10. <http://www2.warwick.ac.uk/fac/soc/ier/futuretrack/findings/elias_purcell_soche_final.pdf> [↑](#footnote-ref-10)
11. <http://www.llakes.ac.uk/sites/llakes.ac.uk/files/50.%20Green%20and%20Henseke_0.pdf> [↑](#footnote-ref-11)
12. http://www.hecsu.ac.uk/current\_projects\_futuretrack.htm [↑](#footnote-ref-12)
13. http://www.hecsu.ac.uk/assets/assets/documents/futuretrack/Futuretrack\_Stage\_3\_Working\_Paper\_4.pdf [↑](#footnote-ref-13)
14. Brown, P. and Hesketh, A. (2004) ‘The Mismanagement of Talent – employability and jobs in the knowledge economy’, Oxford: Oxford University Press [↑](#footnote-ref-14)
15. <http://aces.shu.ac.uk/employability/resources/DIUS_HighSkillsHighValue.pdf> [↑](#footnote-ref-15)
16. Details in Futuretrack Working Paper 4: Graduate labour market supply and demand: Final year students’ perceptions of the skills they have to offer and the skills employers seek <http://www.hecsu.ac.uk/assets/assets/documents/futuretrack/Futuretrack_Stage_3_Working_Paper_4.pdf>. [↑](#footnote-ref-16)
17. This paper also starts with a review of skills metrics and this review is a good starting point for anyone who wishes to revisit parts of the debate from first principles; other recommendations include the work of Mantz Yorke and Tony Watts on defining and measuring employability. [↑](#footnote-ref-17)
18. http://www.hecsu.ac.uk/assets/assets/documents/Futuretrack\_Stage\_4\_Final\_report\_6th\_Nov\_2012.pdf [↑](#footnote-ref-18)
19. <https://www.luminafoundation.org/files/resources/galluppurdueindex-report-2014.pdf> is a version of the report that is available online. A summary of the 2015 results can be found at http://www.purdue.edu/newsroom/gallup/docs/GPI\_overview.pdf [↑](#footnote-ref-19)