Richard Review of Apprenticeships:

Science Council Evidence

The Science Council

1. The Science Council was established in 2003. It is an umbrella organisation for learned societies and professional bodies in science and currently has 40 member organisations drawn from across science and its applications: a list of current member organisations is attached. In addition to providing a mechanism for the sector to work collectively, the Science Council develops and leads collaborative projects working with member bodies and the wider scientific community: examples include the Future Morph website[1] designed to provide young people with information about careers opportunities, and LMI analysis of the UK Science Workforce.[2]

2. The Science Council also works to advance the professional practice of science and since 2004 has awarded the professional qualification of Chartered Scientist (CSci) with 15,000 individuals currently registered. It is now leading an initiative that aims to raise the profile, aspirations and retention of technician and graduate scientists by developing new professional registers at these levels (Registered Scientist and Registered Science Technician); these were launched early in 2012.

3. Collectively our member bodies represent more than 400,000 individual members, including scientists, teachers and senior executives in industry, academia and the public sector.

4. The Science Council has a keen interest in enhancing the level and quality of science education, knowledge and skills in the UK and welcomes the opportunity to contribute to this timely review of apprenticeships.

Skills needs for science

5. The Science Council has welcomed the Government's renewed interest and focus on apprenticeships and vocational skills. There is well-documented demand for science, technology, engineering and mathematics (STEM) skills in the current UK economy. Estimates from UKCES suggest that 58% of all new jobs in the UK economy will require a high level of STEM skills (at least Level 3 or 4). It is unlikely that roles will be defined by the core science subject and employees will use science methodology in a variety of ways and in a wide range of contexts. Recent research undertaken on behalf of the Science Council explored the entire UK workforce, including in its analysis the whole economy and not just the 'science' sectors, shows that currently 20% of the UK workforce is employed in science roles, 1.2m primary science workers and 4.6m secondary science workers.[3] This is projected to rise to 7.1m people by 2030. The broad groupings are defined below:

    - Primary science workers: workers in occupations that are purely science based and require the consistent application of scientific knowledge and skills in order to execute the role effectively.
    - Secondary science workers: workers in occupations that are science related and require a mixed application of scientific knowledge and skills alongside other skill sets, which are often of greater importance to executing the role effectively.
    - Non-science workers: workers in occupations that are not science based and have no requirement for science based knowledge or skills.

[1] http://www.futuremorph.org/
[2] *The current and future UK science workforce* TBR, Sept. 2011 http://www.sciencecouncil.org/content/science-workforce
[3] *Ibid.*

6. The use of science knowledge and skills pervades the economy, not just within academic and research sectors. As science is developed and applied there has been an increase in the demand for STEM skills across the economy, often in "hidden sectors" areas not normally considered STEM employers, such as food and drink or textiles. These "hidden" aspects of the demand for science skills add to the difficulty of quantifying the numbers required. A further complexity is the lack of fit between workforce and skills terminology which has led to misconceptions regarding the employment destinations of STEM graduates and masks the location of, and demand for, technicians. However, all indications are that demand from all employment sectors for STEM skills is steady or increasing.

7. The 2010 UKCES National Strategic Skills Audit[4] highlights areas of growth in the economy including the following STEM related sectors: advanced manufacturing, life sciences and pharmaceuticals, low carbon economy, professional and financial services, digital economy and engineering and construction. In addition the UK will need to develop a new generation of wealth creation sectors in such areas as fashion, creative industries and energy generation, all of which are likely to increase demand for STEM skills and awareness. Innovation and increasing use of technology is also driving demand for STEM skills in the public sector, including areas such as local government, regulation, monitoring and policy. Other employment sectors dependent upon increased technology include health, retail, communications, agriculture and aquaculture and environment.

8. A number of sectors have a looming problem with an aging workforce, for example, agriculture and aquaculture, metals and professional organisations and consultancy where an above average proportion of science workers are in older age groups. Some of the ageing effects also have strong regional dimensions. Another indication of this problem is the length of time workers have held their current role and with sectors such as agriculture and aquaculture data shows that an above average proportion of workers have been in their role for more than 20 years.[5] Accordingly some sectors will be skilling up their workforce and others seeking to attract new talent.

9. It is therefore clear that the UK economy will require a significant increase in the numbers of individuals with STEM education and training to populate the future workforce, potentially through SET apprenticeships.

Science apprenticeships

10. Science is currently perceived as a graduate entry profession and vocational qualifications account for less than 10% of Level 3 science provision. It is clear that in comparison to sectors such as engineering there are far fewer science apprenticeships: in 2009/2010 across science and science related apprenticeships there were close to 3,300 starts at intermediate level and nearly 5,900 at advanced level; this compares to nearly 35,000 intermediate level starts, 25,000 advanced level starts for engineering in the same period.[6]

11. Many factors contribute to low numbers of science apprenticeships including the fact that the science sector itself is difficult to define with science related occupations to be found across many employment areas and a large proportion of SME employers, 58% of STEM graduates are employed by SMEs.[7]

[4] http://www.ukces.org.uk/ourwork/nssa
[5] *The current and future UK science workforce*, Sept. 2011, TBR for the Science Council
[6] *FE and Skills STEM Data,* July 2011, Royal Academy of Engineering for BIS
[7] Unpublished analysis of Labour Force Survey

Quality assurance of apprenticeships

12. Quality assurance for apprenticeship schemes is a key area of concern and despite some improvement both the apprenticeship and technician brands continue to suffer from negative perceptions from both employers and individuals, as illustrated by the BBC's recent Panorama programme. Linking science apprenticeships to professional registration could provide independent quality assurance for both employers and individuals.

13. By its very nature science is a developing and evolving field, as businesses adapt to these developments so the job roles change over time. Life-long jobs no longer exist and apprenticeships must train individuals for occupations rather than specific jobs. An apprenticeship should provide skills and knowledge that are valuable to more than one employer or role and meet the broader requirements of the profession. For example analytical chemistry and microbiology techniques are used for quality control within the water industry but the skills and knowledge will also be relevant to other industries applying sampling techniques for quality assurance, in the food, health or agriculture sectors.

14. Linking apprenticeships to professional registration can demonstrate this transferability as the professional standards are designed to apply across the profession and across employment sectors. This link will also serve to develop awareness that there are non-graduate entry routes to science careers. The Technician Council found that registration across sectors share common features[8]:

    - A combination of professional membership and registration
    - Defined standards for entry
    - Defined qualifications and competence gained in work
    - Defined codes of ethical conduct
    - Requirements for on-going professional development

15. As well as assuring transferability professional registration and the associated membership of a professional body provides individuals with a connection to the relevant professional community. This sector specific community, which already promotes science career paths to young people, would appear to be a more useful connection for science apprentices than the Holt Review's proposal of a cross-sector Society for apprentices[9].

16. The Science Council has been piloting new levels of professional registration to sit alongside the established Masters level Chartered Scientist and create a framework that embraces scientists and science technicians. All levels of the register assure current competence and recognise knowledge, experience and professionalism.

17. Working with partners in the Technician Council, the Science Council has set professional standards that map to those for registration in other technical professions, such as engineering. This, again, will aid employers as it simplifies comparison across professions. The Gold Standard developed by Cogent for the process industry[10] is an example of a Competency Framework established for a similar purpose although this does not have the advantage of mapping to the Technician Council's registration framework, and is not linked to professional body membership.

[8] *Professional Technician: The Future*, Technician Council, 2012
[9] *Making apprenticeships more accessible to small and medium-sized enterprises* Jason Holt, May 2012, p18
[10] http://www.cogent-ssc.com/Gold_Standard/

18. The Science Council's three levels of registration provide recognition and the potential for progression:

    - Registered Science Technician, RSciTech
      Qualified to QCF Level 3, typical routes: A levels, Advanced Apprenticeship, BTEC National

    - Registered Scientists, RSci
      Qualified to QCF Level 5, typical routes: Higher Apprenticeship, HNC/HND, Foundation degree

    - Chartered Scientist, CSci
      Qualified to QCF Level 7, typical route: Masters degree

19. As part of the development of the new levels of registration the eight pilot license bodies are mapping the relevant qualification landscape.[11] The exercise will also assist the identification of gaps in the provision of vocational qualifications and will aid employers' understanding of qualifications and their ability to identify high quality provision.

Growing science apprenticeships

20. As previously discussed science employers are to be found across all sectors of the economy as a result of this science falls within the footprint of many of the Sector Skills Councils, for example, Cogent, Semta, Improve, Lantra, Skills for Health, Energy and Utility Skills and Proskills. Since many of these employers are small the Sector Skills Councils can play a valuable role in grouping them together, however, some skills requirements will be common across sectors and the design of apprenticeships will need to reflect this.

21. Demand for apprenticeships will need to be stimulated. Employers will need assurance that the programmes meet their skills needs and offer value for money; young people will need to be aware of apprenticeship opportunities in different employment sectors and geographical locations. New delivery mechanisms will be needed to enable SMEs to fully participate, for example using physical locations such as science parks, or with large employers linking into their supply chains, or perhaps developing the role of Group Training Associations.

22. The Science Council strongly endorses the Gatsby Charitable Foundation's evidence submission and hopes that the wider context provided in our own evidence serves to reinforce the important role that registration can play in supporting apprenticeships. We would be happy to discuss further any of the issues outlined above.

The Science Council September 2012

[11] Association for Science Education, Institute of Biomedical Science, Institute of Food Science and Technology, Institute of Physics and Engineering in Medicine, Institute of Science and Technology, Institution of Chemical Engineers, Royal Society of Chemistry and Society of Biology.

Member Bodies of the Science Council
September 2012

1. Association for Clinical Biochemistry*
2. Association of Neurophysiological Scientists*
3 Association for Science Education**/ ***
4. British Academy of Audiology
5. British Association of Sport and Exercise Science
6. British Computer Society*
7. British Psychological Society*
8. British Society of Soil Scientists*
9. Chartered Institution of Water and Environmental Management*
10. College of Podiatry
11. Energy Institute*
12. Geological Society of London*
13. Institute of Biomedical Science*/ **
14. Institute of Brewing and Distilling*
15. Institute of Clinical Research*
16. Institute of Corrosion*
17. Institute of Food Science and Technology*/ **
18. Institute of Marine Engineering, Science and Technology*
19. Institute of Materials, Minerals and Mining*
20. Institute of Mathematics and its Applications*
21. Institute of Measurement and Control
22. Institute of Physics and Engineering in Medicine*/ **
23. Institute of Physics
24. Institute of Science and Technology**
25. Institution of Chemical Engineers*/ **
26. Institution of Environmental Sciences*
27. London Mathematical Society
28. Mineralogical Society*
29. Nuclear Institute*
30. Oil and Colour Chemists' Association*
31. Physiological Society
32. Royal Astronomical Society
33. Royal Meteorological Society
34. Royal Society of Chemistry*/ **
35. Royal Statistical Society*
36. Society for Cardiological Science and Technology
37. Society for General Microbiology
38. Society of Biology*/ **
39. Society of Dyers & Colourists

* Licensed to award Chartered Scientist (CSci)
** Licensed to award Registered Scientist (RSci) and Registered Science Technician (RSciTech)
***Licensed to award Chartered Science Teacher (CSciTeach)